

About the organization and key achievements

King Institute of Preventive Medicine was primarily established as a public health lab in 1897. Subsequently the manufacture of small pox vaccine was the forerunner for other vaccine manufacturers. While functioning as a public health lab, several great strides and achievements in control of bacterial diseases were made and documented. The Research unit of King Institute of Preventive Medicine was designated as Department of Virology in 1969 vide G.O.Ms.No.498/ Health dated 18.3.1969.

Infrastructure:

- The Institute has comprehensive facilities for Diagnosis, Research and Teaching. The Department of Virology was designated as National Polio Lab
- Virology Department at KIPM has established surveillance for Influenza viruses through their sentinel centres in and around Chennai.
- KIPM is also involved in surveillance research and diagnosis of other diseases like Polio, Dengue, Chikungunya, Japanese Encephalitis, Herpes Simplex virus etc.

OBJECTIVES

- To provide an integrated and conceptual and unique training platform for virology at par with international standards
- To provide a comprehensive theoretical knowledge of and practical training in virology including mechanisms of virus spread, disease causation, diagnosis, treatment and/or prevention of viral infections of major significance to public health.
- Provide state-of-art on hand training in interdisciplinary methods of virus research to young scientists.
- To create Virologists with sound knowledge of Research & Diagnosis.

Functions of KIPM

- National Polio Laboratory- NPSP WHO
- Regional Influenza Surveillance centre-ICMR WHO
- National Measles Laboratory
- Arboviral Diagnostic Center.
- Miscellaneous viruses-HSV, Coxsackie etc
- Manufacture of vaccines & anti sera
- Manufacture of Oral Rehydration Salt
- Preparation of diagnostic reagents
- Bacterial, Viral diagnostic & blood grouping tests
- Academic, Research and Training
- International vaccination Centre
- Innovations in education.
- Training Medical and Paramedical students.
- Research in Medical and related sciences.
- Community based teaching and research.

Department of Virology
King Institute of Preventive Medicine & Research

Genesis

King Institute of Preventive Medicine was primarily established as a public health lab in 1897. Subsequently the manufacture of small pox vaccine was the forerunner for other vaccine manufacture. While functioning as a public health lab several great strides and achievements in control of bacterial diseases were made and documented. It was also a period when not much was known about viral disease and laboratory diagnosis. It was only in 1950's that diagnostic methodologies for few viral diseases were being made. This was largely possible because of the breakthrough made in maintenance of tissue culture.

Fore fathers of KIPM had the vision and fore thought and saw the need to establish a separate department of Virology. The Research unit of King Institute of preventive Medicine was designated as Department of Virology in 1969 vide G.O.Ms.No.498/Health dated 18.3.

Establishment of Tissue Culture lab

The primary task of the new department was to establish a Tissue Culture Lab. The Department was facing hurdles for several years, as expertise in the new field of tissue culture was not available. Deputy Director, Dr. Sumathy Vasudevan, a Medical Microbiologist was trained at Ruchill Hospital, Glass grow, U.K. for period of 3 months under WHO fellowship in 1977. The tissue culture lab that is the backbone of Diagnostic Virology was thus established which paved the way for Diagnostic Virology and all subsequent developments.

Today the department boasts of a wide collection of cell culture, which is being supplied to all leading Institutes. It is also a training ground for young budding Virologists and Biotechnologists.

Considering the progress made, the Government of Tamil Nadu sanctioned Rs.7 lakhs for the construction of 4 cubicles for an exclusive Tissue culture laboratory facility. This became operational in 1994.

From the small nucleus established in 1969 the Department of Virology has grown in leaps and bounds and currently number of activities are carried out. It has been recognized and commended by National and International bodies, ICMR, NIV, WHO, & CDC to name a few. The department besides performing diagnostic tests also acts as the WHO National lab for Polio and Measles. The activities of the Department are outlined.

Diagnostic Virology

Consequent to the establishment of the Tissue Culture Lab, preliminary diagnostic virological techniques was introduced and with training acquired by the technical staff in premier national labs serological diagnostic work involving HAI, CFT, and NT were established by 1985.

Second and third generation sophisticated diagnostic tests – ELISA, and molecular tests – PCR and Real time PCR are being performed today. The tests are made available free of cost for the poor and economically backward population referred from government hospitals. A nominal fee is collected for testing from private hospitals.

Department of Virology is one of the laboratories identified by NICD for the National Surveillance program for communicable diseases (NSPCD program). Laboratory equipments, consumables, chemicals, travel expenditure and contingencies were provided for diseases surveillance. Diseases under surveillance are Dengue, JE, Chikungunya, Measles, and Rubella.

Functions

- **Diagnostic testing** of clinical samples from cases of PUO, Encephalitis, myocarditis, fever with rash, for other viruses like Coxsackie, ECHO, HSV –1 & 2, Rubella, and Measles is done as a routine.
- **National Surveillance for Preventable & Communicable diseases**
Outbreaks of measles were investigated in the year 2002, utilizing the funds provided by NSPCD.

Oral Polio Vaccine potency testing centre

One of the vaccines that were introduced under the EPI of GOI was the OPV. It was necessary to check the potency of the oral Polio vaccine, a highly heat labile live attenuated viral vaccine. This was to ensure the efficacy of the cold chain system that was implemented to take care of the potency of the OPV. Therefore GOI was on the look out for laboratories that could take up this task. In 1988 a high level team of experts from ministry of health, GOI evaluated and identified the department of virology as a potential OPV testing lab. It was essential to post a Medical Microbiologist to undertake this task. One Medical Microbiologist was posted to the department of virology by redeployment from within the institute. National training workshop was conducted by GOI at Enterovirus laboratory, Haffkine Institute Bombay for participants from the 8 identified labs in the country, the department of virology KIPM was one of them. Medical officer and technician were trained at the workshop. Thus the Regional centre for Potency testing of OPV was established vide Ref.No.T-22018/3/86 dated September 1988– EPI of DGHS GOI and testing of vaccines from Tamil Nadu and Pondicherry was started. Government of India made an initial grant of 1.4 lakhs for purchase of equipments in 1989. Subsequently a sum of Rs.40,000/ annum was sanctioned till 1995 towards contingencies for OPV testing. The grant was increased to Rs.75, 000/- annum from 1996 till 2002.

The OPV testing centre became fully operational in 1989 and the number of vials tested gradually increased. The testing facility was extended to the states of Kerala, Karnataka, and Andhra Pradesh and Union territory of Andaman.

National Polio Lab.

In 1987 GOI had adopted the resolution of the WHO for eradication of Poliomyelitis. OPV was introduced and consequently the incidence of Polio was coming down. At this stage it was necessary to establish a laboratory for confirmation of the disease. Therefore GOI envisaged and adopted the global WHO initiative and identified potential National Polio laboratories.

The Department of Virology KIPM was one of the 9 labs identified in the country. The WHO expert committee visited and evaluated the potential of the lab and department was designated as WHO National Polio Lab. Officers and Technical staffs have been trained in the WHO workshops conducted over the years and are fully competent to carry out all the techniques in use in Virology Laboratory.

The lab is supported by National Polio surveillance project a GOI/WHO undertaking. The required manpower - scientists, technical and non-technical staff, consumables, equipments and reagents are supported by the project. The lab functions under the direct supervision of the Deputy Director who is designated as the Polio Lab Coordinator.

Functions

- Polio virus isolation and identification from stool samples of AFP cases from Tamil Nadu, Andhra Pradesh, Andaman and Pondicherry
- Monitoring efficacy of cold chain maintenance of OPV used in Immunization programme by testing potency of the vaccine
- Environmental surveillance for Poliovirus from Sewage and healthy children.

Arbovirus lab.

Tamilnadu is endemic for life threatening Arboviral diseases, Dengue and Japanese Encephalitis. In the early 90's diagnosis was based on first generation diagnostic technique the Haemagglutination Inhibition test for which National Institute of Virology supplied antigens. By mid 90's it was increasingly difficult to procure the required antigens from NIV, it was therefore proposed to prepare the antigens in the Department of Virology. One medical officer and technician were deputed for training in preparation of antigens to NIV field station at Bangalore.

Directorate of public health largely facilitated the establishment of the center. The workload had increased several folds and it was proposed that a Deputy Director should supervise the antigen preparation and arboviral diagnostic testing. Proposal was submitted to the Government which was accepted and the post of Deputy Director ARV was deployed to Arboviral diagnostic centre vide G.O (D). No.268, Health & Family Welfare department dated 23.3.00.

Today we are self sufficient in the required Dengue and JE antigens. Elisa and molecular based diagnostic tests are now possible. An added achievement is the standardization of tissue culture antigen in place of mouse brain antigen, thus reducing the dependence on maintaining an animal house.

Functions

- **Arboviral centre**
 - Mouse brain D2 antigen was prepared in 1999. Once this was achieved D1, 3, 4, JE and West Nile viral antigens were subsequently prepared in 2000 & 2001.
 - C6/36 cell line (*Aedes albopictus*) was obtained from NCCS and was used for preparation of cell line antigen of D1-4, JE viruses.
 - Tests designed, evaluated and standardized inhouse.
 - IgM capture ELISA for Dengue and JE
 - IgG ELISA for Dengue
 - Rapid Immunochromatographic card test – Dengue
 - HAI test using cell line antigen
 - Serosurveillance for Dengue antibodies in all the districts of Tamil Nadu and mapping of Dengue endemic zone was done in 2000 and 2001
 - Group specific PCR and serotype specific PCR for Dengue have been standardized and is operational

Influenza lab

There are lacunae in the knowledge of Influenza viral activity another very common viral disease. Very few centers, NIV and AIIMS conduct studies on influenza. An Expert Influenza virologist from CDC Atlanta USA visited the Department of Virology and encouraged the setting up of an Influenza surveillance and diagnostic facility. The Deputy Director was invited on a two-month fellowship for training at the Influenza division of CDC. Consequently the Influenza lab has been set up and is fully operational. CDC is supplying the required reagent and antigens free of cost. The department functions as Regional surveillance center.

A surveillance system was established to detect the exposure of the population to influenza viruses and identify the currently circulating virus for implementation of vaccination. With this objective, seroprevalence study for screening of antibodies to Influenza viruses was started in the year 2000, in collaboration with and funding by CDC, Atlanta. Influenza virus isolation in MDCK cell culture was started from February 2002. It is envisaged that the lab would be designated as an ICMR coordinated National Influenza Network Laboratory, for which preliminary work has been initiated. The lab was designated as Regional Influenza Surveillance Centre by ICMR in 2004 and then H5 detection centre was established in 2007 and now it is involved in collection of samples from suspected swine flu infected cases, will take up testing of them very shortly.

Functions - Surveillance centre for Influenza virus

- Influenza virus isolation and serotyping
- Sero surveillance studies for human Influenza viruses
- A serosurvey study for screening of antibodies to Avian Influenza viruses was conducted in 2002. Samples were collected from poultry workers and healthy individuals (controls) from Chennai, Tiruppur and Namakkal. Samples have been tested for antibodies against human influenza viruses and sent to CDC for screening of antibodies to Avian Influenza viruses.
- Detection of H5 infections in humans.
- Collection of samples from suspected novel H1N1 cases.

WHO Measles laboratory network

The WHO/ GOI has initiated the Measles control / elimination program. This involves lab confirmation of measles outbreaks and case confirmation. A national network of laboratories is to be established. In the initial phase only two labs have been identified, Department of Virology is one of them. Deputy Director and scientist have been trained at a WHO workshop conducted by NIV. The Measles lab is fully functional and is supported by GOI.

Functions

- Investigation of measles outbreaks and laboratory confirmation for measles by serology
- Molecular epidemiology by virus isolation & sequencing.

Teaching and research

Having established a state of the art virology lab with excellent tissue culture lab and diagnostic facility, it was felt that this expertise should be utilized to spread the knowledge and train young scientists.

The department besides training Medical Microbiologists deputed from medical colleges also trains non-medical microbiologists for a nominal fee. Several tissue culture workshops have been conducted which is always in demand. Besides students are encouraged to take up virology topics for dissertation projects for which Rs 5000 is collected and necessary facility is made available to the student.

The Department is recognized by Dr MGR Medical University as a center for PhD work. Dr Nalini Ramamurthy, then Deputy Director was a recognized Ph.D guide. Dr.P.Gunasekaran Deputy Director and Head is recognised as guide by Tamil Nadu Dr.MGR Medical University.

Teaching and Research

Training is being imparted in the art of cell culture maintenance and in viral diagnosis to students of MD Microbiology, MSc Microbiology, Biochemistry, Biotechnology and PhD. DMLT and CMLT students are trained in basic techniques of virology lab.

Selected students are encouraged to pursue dissertation projects in Virology.

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4. Indian Council of Medical Research
5. Centre for Disease Control, Atlanta
6. ICDS
7. Tamil Nadu AIDS Control Society.
8. Integrated Disease Surveillance Project.