Institute of Advanced Virology
Thiruvananthapuram

ANNUAL REPORT
2022-2023


FOUNDATION STONE LAYING CEREMONY
INSTITUTE OF ADVANCED VIROLOGY (IAV)
By
Pinarayi Vijayan
Minister of Kerala
2018, 12
Noon

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Publication Committee:

Dr. Mohanan Valiya Veettil

Dr. Anismrita Lahon

Mr. Vinod S

Ms. Shilpa Ravindran

Mr. Gopikrishnan K

Ms. Fathima Zahra C

Mr. Renjith R S Nair

From the Director's Desk

Dr. E Sreekumar

Establishment of an advanced research center for virology was a longstanding requirement for the state of Kerala which had witnessed continuous threat from emerging viral infections. Inauguration of the Institute of Advanced Virology in 2019 and its subsequent initiation of research activities by 2022 have helped us to move forward in this goal.

Kerala's close proximity to Western Ghats, a global biodiversity hotspot and home to fauna that may harbor an array of unknown pathogens; and the state's highly vibrant tourism which represents a global diaspora, have made the state vulnerable to emergence of new viral infections. IAV strives to support the state by extending complete spectrum solutions that spans from early outbreak detection to offering preventive vaccines and therapeutics. The eight departments of the institute are designed with focused goals to develop platform technologies and prototypes to convert the advanced theoretical knowledge generated into translational outcomes for public benefit. Well focused research programs are in place that will develop novel monoclonal antibodies, bioassay platforms, antiviral and diagnostic leads as well as vaccine platforms against emerging viruses.

For us, the careful nurturing, hand-holding and ample encouragement from well-wishers are the pillars of strength. IAV enjoys these from the Government of Kerala and the public at large, who is keeping a close watch with great expectations. The team at IAV, young, energetic and enthusiastic, is well aware of these responsibilities, and is committed.

IAV presently functions from a beautiful, well-designed 27,000 sq. ft building, which has recently added another 80,000 sq. ft. area to expand its laboratories. An advanced molecular diagnostic facility is already functional where we offer a syndrome-based diagnosis for more than 80 virus infections. A state-of-the-art Biosafety Level -3 laboratory, instrumentation facilities including genome sequencing and cellular imaging platforms, and experimental animal house facilities are being set up. Also, IAV has established active collaborations with medical colleges and research institutions within the state and outside to expand its research activities. We are in the process of initiating academic programs soon including a PhD program in medical virology.

In the coming years, IAV envisions to be a center of significant public health importance and deliver key contributions to core virology research capacity as well as pandemic preparedness of the country.

Governing council

The composition of the Governing Council of the Institute are as follows:

1	Hon'ble Chief Minister of Kerala	Chairperson
2	Hon'ble Minister for Health & Family Welfare, Govt. of Kerala	Vice Chairperson (Ex Officio)
3	Chief Secretary, Govt. of Kerala	Ex Officio Member
4	Secretary, Department of Biotechnology, Govt. of India	Ex Officio Member
5	Secretary, Department of Science and Technology, Govt. of India	Ex Officio Member
6	Director General, Indian Council of Medical Research (ICMR), Govt. of India	Ex Officio Member
7	Additional Chief Secretary (Finance), Govt. of Kerala	Ex Officio Member
8	Principal Secretary, Science & Technology Department, Govt. of Kerala	Ex Officio Member
9	Principal Secretary (Health), Govt. of Kerala	Ex Officio Member
10	Secretary, Animal Husbandry, Govt. of Kerala	Ex Officio Member
11	Director, National Institute of Virology (NIV), Pune	Ex Officio Member
12	Director, Vector Control Research Centre (VCRC), Puducherry	Ex Officio Member
13	Director, Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram	Ex Officio Member
14	Director, Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram	Ex Officio Member
15	Director, Health Services, Govt. of Kerala	Ex Officio Member
16	Director, Medical Education, Govt. of Kerala	Ex Officio Member
17	Chairperson, Research Advisory Committee, Institute of Advanced Virology (IAV)	Ex Officio Member
18	Director, Institute of Advanced Virology (IAV)	Convenor (Member)

Government Nominees in the first Governing Council

1	Dr. William Hall, Senior Advisor IAV & Professor of School of Medicine, University College, Dublin	Member
2	Shri. M.C. Dathan, Mentor (Science), Govt. of Kerala & Former Director, Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram	Member
3	Prof. M Radhakrishna Pillai, Former Director, Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram	Member
4	Prof. Suresh Das, Emeritus Professor, Indian Institute of Science Education and Research (IISER), Thiruvananthapuram	Member
5	Prof. S. Murty Srinivasula, Professor (Biology), Indian Institute of Science Education and Research (IISER), Thiruvananthapuram	Member
6	Dr. B. Ekbal, Former Member, Kerala State Planning Board	Member
7	Dr. T. Jacob John, Retd. Professor, Clinical Virology, Christian Medical College (CMC), Vellore	Member

The Governing Council was constituted during January 2023 and the meeting of the Governing Council has not happened during the Financial year 2022-23.

Executive committee

The composition of the Executive Committee of the Institute are as follows:

1	Principal Secretary, Science & Technology Department, Government of Kerala	Chairperson
2	Director, Institute of Advanced Virology (IAV)	Convenor (Ex Officio)
3	Secretary, Finance Department, Govt. of Kerala or an officer authorised by the Secretary	Member (Ex Officio)
4	Additional/Joint Secretary, Science & Technology Department, Govt. of Kerala	Member (Ex Officio)
5	Head of Administration/ Administrative Officer, Institute of Advanced Virology (IAV)	Member (Ex Officio)
6	Member Secretary, Kerala State Council for Science, Technology & Environment (KSCSTE)	Member (Ex Officio)
7	Dr. T. R Santhosh Kumar, Scientist G, Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram	External Nominees
8	Dr. G. Srinivas, Scientist G & Acting Head, Department of Biochemistry, SCTIMST	External Nominees
9	Dr. Mohanan Valiya Veettil, Senior Principal Scientist, Institute of Advanced Virology (IAV)	Nominee Scientific staff
10	Mr. Nithin Besent N, Technical Officer, Institute of Advanced Virology (IAV)	Nominee Technical staff

Research Council

The composition of the Research Council of the Institute are as follows:

1	Dr. N.K Ganguly, Former Director General (DG), Indian Council for Medical Research (ICMR)	Chairman
2	Dr. T. Jacob John, Christian Medical College (CMC), Vellore	Member
3	Dr. G. Arun Kumar, Manipal Academy of Higher Education (MAHE)	Member
4	Dr. Saumitra Das, Director, National Institute of Biomedical Genomics (NIBMG)	Member
5	Dr. S. Murthy Srinivasula, Indian Institute of Science Education and Research (IISER), Thiruvananthapuram	Member
6	Dr. Manju Bansal, Indian National Science Academy (INSA) Senior Scientist, Indian Institute of Science (IISc), Bangalore	Member
7	Dr. Amit Dutt, Tata Memorial Centre (TMC), Mumbai	Member
8	Dr. Rangarajan P.M, Indian Institute of Science (IISc), Bangalore	Member
9	Dr. Subash Vasudevan, Duke- National University of Singapore (NUS), Singapore	Member
10	Dr. S. Swaminathan, International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi	Member
11	Dr. Naveen Khanna, International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi	Member
12	Dr. Shyamasundaran Kottilil, Director, Institute of Human Virology, Baltimore, University of Maryland, USA	Member
13	Dr. Debashis Mitra, Director, Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad	Member
14	Dr. K. Dharmalingam, Research Director, Aravind Medical Research Foundation, Madurai	Member
15	Dr. Koen K. A. Van Rompay, Full Research Virologist, California Primate Research Institute, California, USA	Member
16	Director, Institute of Advanced Virology (IAV)	Member - Convenor

The second Research Council meeting was held on 11.10.2022.

Introduction

Institute of Advanced Virology (IAV), is an autonomous institution established in the year 2019 under the Science and Technology Department, Government of Kerala. IAV is located in the Bio 360 Life Sciences park, Thonnakkal, Thiruvananthapuram. The institute, in collaboration with world leaders in virology, is in the process towards establishing global standards in research, diagnosis and management of emerging/re-emerging viruses. To address the pressing needs in virology research and to foster young talents, IAV is well-equipped with state-of-the-art laboratories. IAV acts as a center of excellence in virology and serves as a key player in productive scientific exchange and as a referral diagnostic facility for the tertiary care hospitals in the state. IAV contributes to society through early and accurate diagnostics of viral infections, discoveries and knowledge generation in virology. IAV's flagship programs are devised towards generating products that are potentially translatable for the overall benefit of mankind.

IAV has already established six BSL-II level research laboratories, a core instrumentation facility which accommodates the ultra-modern equipment to facilitate research in various domains of virology and a synthetic chemistry laboratory in its first phase. The works of eight more BSL II level labs is in the final stages.

The Molecular Diagnostic Facility (MDF) of the Institute is well equipped and fully functional with all classical virological systems and showcases the state-of-the-art molecular diagnostic virology facility up to nucleic acid sequencing level. MDF has the capacity to diagnose more than 80 types of viruses/virus associated diseases employing both serological and molecular methods. The facility functions as a referral laboratory for the region. A Metagenomic Sequencing Facility to detect unknown pathogens from the clinical samples has also been started as part of the MDF.

A viral Bioassay Facility towards vaccine immune studies and zero surveillance studies is also functioning. A Synthetic Chemistry Laboratory is equipped to carry out multistep organic synthesis focused on synthesis of antiviral drugs against existing and newly emerging viruses.

A BSL-III facility with two BSL III level virus labs and associated facilities are being established in the Institute to carryout research on highly pathogenic viruses. A transgenic animal experimental facility towards housing/breeding & conducting experiments on various types of small animals is also being established.

Institute is also in the process of providing incubation facilities for the start-ups and R&D facilities for established companies. Our target is time-bound development of deliverables in shape of new generation molecular diagnostics, monoclonal antibody therapeutics, antivirals and nucleic acid-based vaccines against emerging viruses.

Mission

To harness the best and eliminate the worst of viruses for a better human life.

Vision

To develop state-of-the-art infrastructure, skilled scientific & technical personnel, and services & products in virology to serve local, national and global needs.

HIGHLIGHTS OF THE YEAR

Outreach program

Events/ Workshops/ Conferences

Workshop on Monoclonal Antibodies, an emerging era in biological: Principles of production, applications in immunodiagnostics and therapeutics on 8th & 9th December 2022.

National Science Exhibition in connection with the 35th Kerala Science Congress held at Mar Baselios Christian College of Engineering, Kuttikkanam, Idukki from 10th - 14th February 2023.

Infrastructure Development Commissioned

Molecular Diagnostics Facility

Core Instrumentation Facility

Synthetic Chemistry Laboratory

New initiatives during the period 2022-23:

Flagship Research Programmes

Overview

Kerala is one state in the country that had multiple outbreaks of several infectious diseases in the last two decades. Following an explosive outbreak of Chikungunya in 2006, the state witnessed sequential outbreaks of Dengue and Swine influenza H1N1, followed with two Nipah out breaks, Zika outbreaks and the pandemic of Corona virus. In all these acute febrile illnesses, molecular diagnostics played a key role in confirmatory diagnosis. Among these, the most important was the detection of the first outbreak of Nipah virus which greatly helped in early detection of the cases and control of the spread. The support of molecular diagnostics in SARS CoV-2 has no parallel. With Kerala being the hot-bed of emerging infectious disease due to its location in one of the biodiversity hot-spots on the globe, our dependence on molecular diagnostic tests is bound to increase exponentially.

Since capacity building is a key necessity to address the diagnosis and control of these infections, IAV has given the priority to establish a state-of-the-art molecular diagnostic laboratory to offer services to the public by supporting the diagnostic needs of health care centres. This is envisaged as a flagship programme of the institute that offers an immediate public face to its functioning. Apart from arboviral diagnosis to begin with, the complete spectrum of viral acute febrile illness will be covered in the programme. This will also include de novo sequencing approaches to identify unknown viruses from suspicious samples so as to enable detection of novel pathogens that are emerging in the locality.

Under the research projects of flagship programme, it is aimed to provide a complete spectrum of diagnostic capability for public health services and establishment of 24x7 virology service and became a regional reference laboratory for viral diagnostics.

Flagship programme - Thematic areas of research

Monoclonal antibodies and antiviral drug development against emerging viruses

There is no specific treatment for diseases caused by most of the emerging viruses. COVID-19 pandemic has helped us to evolve the proof of concept of monoclonal antibodies (mAbs) as an early-stage treatment strategy to prevent complications. Monoclonal antibodies are highly specific to the viruses against which they are designed and efficiently neutralize their infectivity if designed and selected carefully. With modern genetic engineering and recombinant DNA technologies, it is possible to synthesize a gene and express the protein from it by advanced laboratories that have expertise in the process. This helps us to make immunogenic proteins that generate protective antibodies even against pathogens such as Ebola and Marburg viruses that are not yet reported in India, but threatens for a future emergence. Once this is done, the protein can be used for animal immunization to generate monoclonal antibodies. Such antibodies can be used for diagnostic as well as therapeutic purposes. Use of transgenic mice that are humanized will support the development of monoclonal antibodies that have therapeutic potential. In our flagship program envisaged for a three-year duration, we aim to establish these capabilities systematically so that we can develop high quality mAbs against Kysanur Forest Disease, Nipah, Ebola and Marburg disease viruses.

Nucleic acid-based vaccines against emerging viruses

COVID-19 pandemic supported the clinical use of nucleic acid vaccines which had been a proven concept in the research laboratories even a decade back. With the successful use of mRNA vaccine against the diseases, the concept can now have been extended to other viral infections that are emerging. As for the monoclonal antibodies, the synthetic gene approach can be efficiently used for this. Among the nucleic acid vaccines, DNA vaccines offers added advantages of multiplexing ability, thermal stability, and efficient induction of both humoral and cell mediated immunity that persists longer. As part of research program, it is planned to develop a combined DNA vaccine against Chikungunya and Zika, two diseases that are haunting our population since a decade. Both the diseases are transmitted by Aedes mosquitoes; and at present there are no specific vaccines or treatments available. The envelope protein genes of these viruses will be amplified from local isolates of the virus and clone them into suitable plasmid vectors. These constructs will be characterised for their ability to induce required protein expression. Further, using animal models, we will check the efficacy of the vaccine construct produced will be checked in inducing both cell mediated and humoral immunity. the construct will be made ready for industry transfer for further development to produce vaccine for clinical use.

New generation multiplex diagnostic platforms against viral syndromes

Most of the emerging infections begin with acute fever and overlapping symptoms that are difficult to distinguish clinically. The current approach of testing for individual diseases based solely on clinical suspicion leads to missing of many causative organisms, especially those that are newly introduced. Also, with increase in air travel, introduction of exotic disease that are not yet reported in the country are highly possible. This demand development of diagnostic kits with an expanded spectrum of detection, incorporating targets for those pathogens that have a high likelihood of exotic introduction. Development of multiplex kits that uses a syndromic approach with inclusion of diagnostic targets of viruses affecting an organ system, such as respiratory, enteric or nervous system, and others will make them more clinician friendly. Coupling amplification technology to microarray technology in newer diagnostic approaches are under fast development elsewhere. This helps to overcome the limitation of current real-time PCR-based approaches that can detect only up to six targets including internal control, even in the most advanced systems. In the ongoing research it is intended to develop array hybridisation chips or systems that can look for multiple pathogens, in a syndromic diagnostic approach indigenously.

The flagship research programs, in line with the departmental objectives of the institute and the thematic areas, have been conceived and commenced during 2022-23.

Land and Building

The Phase 1B of the Institute with built space of 80,000 sq. ft. has been completed. The Phase IB have a bio-tech wing which will house sixteen BSL II laboratories to carry out focused research in various subjects in the envisaged departments. A viral bio repository, a small animal facility and other research and administrative facilities are also being established in Phase IB.

Phase 1B Building

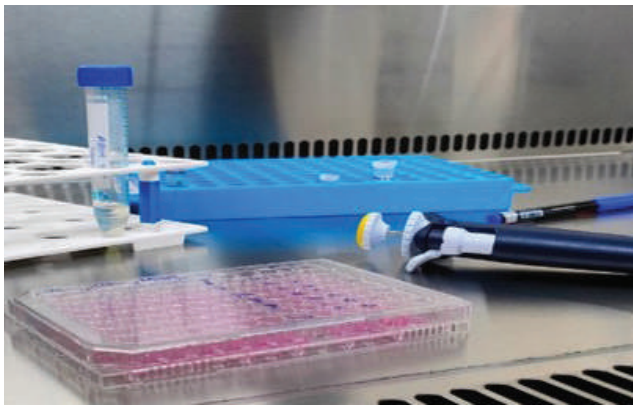
CM's 100 days programme

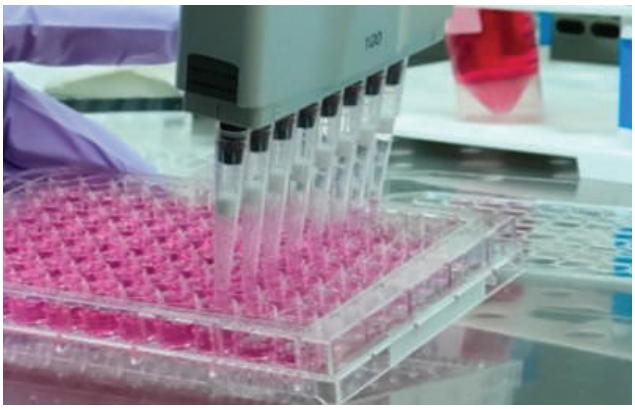
As part of the second 100 days programme of government the following facilities are established in the institute.

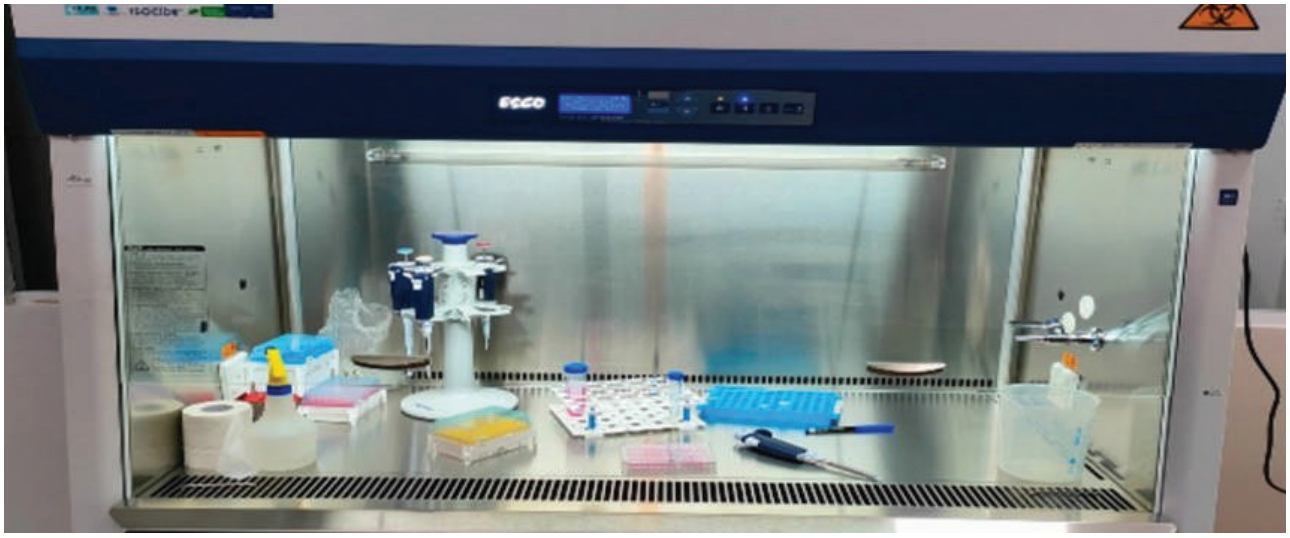
1. 8 BSL II level laboratories in Phase 1B

2. Phage display laboratory

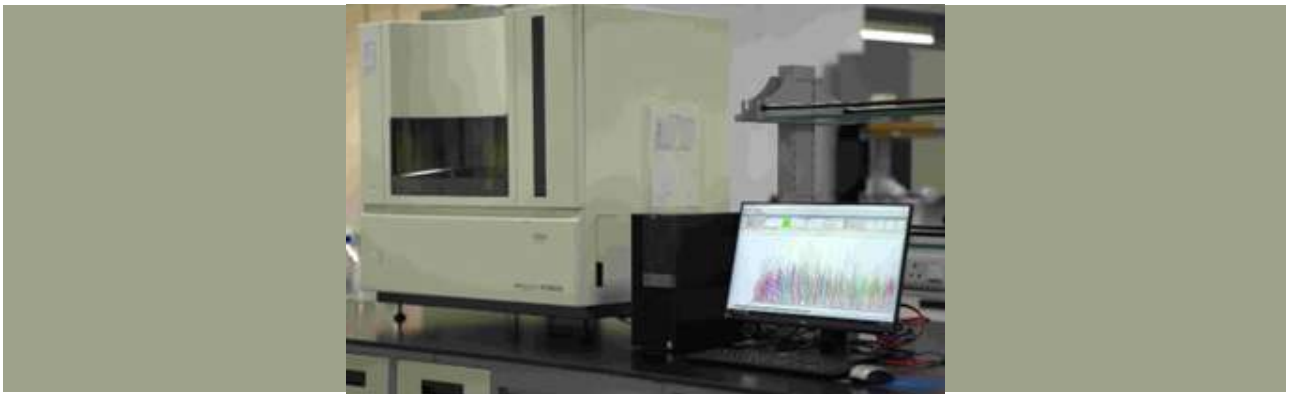
3. Bioassay facility

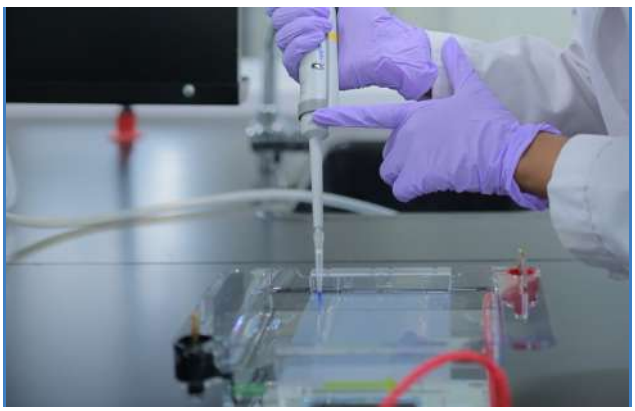






4. Metagenomics sequencing facility



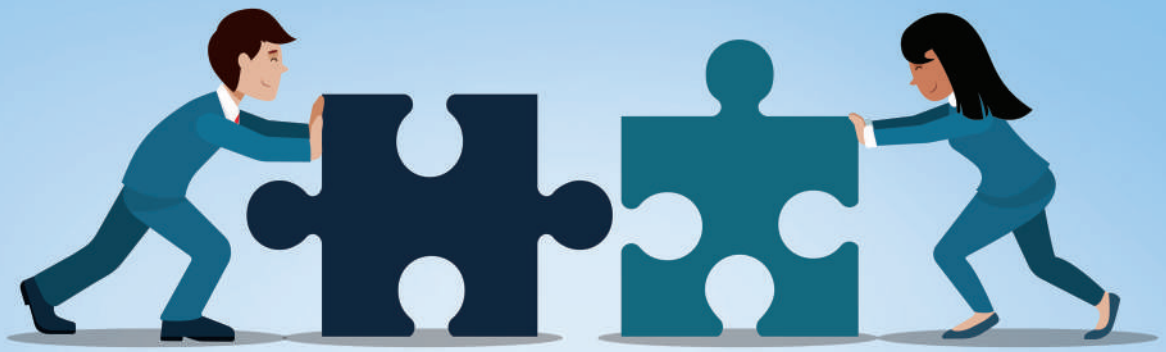


Activities in progress

Transgenic Animal Experimental Facility

BSL-III Laboratory Facility

Small animal Facility for mice



Participatory R&D:

Institute has initiated the Participatory R&D programme to support the health care sector by time-bound development of deliverables in new generation molecular diagnostics, monoclonal antibody therapeutics, antiviral and nucleic acid-based vaccines against emerging viruses in collaboration with life science industries. Under this programme, the companies are encouraged to collaborate with the institute towards development of diagnostic, therapeutic and preventive solutions against viral diseases. The companies can either fund the project or can collaborate in co-development by sharing the IPR rights. TRL 6 readiness level products are expected to be developed which can be further scaled up and commercialized.

In this regard Institute had discussion with several firms and MoU / NDA has been entered into with the following firms:

- Ubio Biotechnology Systems Pvt. Ltd.
- Primordia Lifesciences

Research Collaboration

Institute has entered into MoU with the following institutions towards research collaboration in areas of mutual interest:

- Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram.
- Regional Centre for Biotechnology (RCB), Faridabad.

Brain Gain Programme

Brain Gain Programme was an initiative by Government of Kerala to invite Keralite expats who are experts in advanced fields of science, technology, and social sciences for engaging with courses and involving in researches for the benefits of students and teachers of universities in the state during their sabbatical leave or domestic visits.

Prof. Venugopal Nair, Viral Oncogenesis group, The Pirbright Institute, UK is associating with the Institute as part of the Brain Gain Programme.

Academic activities: Courses/Affiliations

As per the mandates of the Institute in DPR, steps have been taken to commence academic programmes. Institute is currently affiliated with the following universities towards providing academic courses.

- Cochin University of Science and Technology (CUSAT).
- Regional Center for Biotechnology (RCB), Faridabad.

The process of affiliation with Kerala University of Health Science towards providing courses in Medical Virology is in progress.

Institute is planning to commence PhD programmes from the academic year 2023-24 and followed by Masters and Diploma level courses.

External Funded Projects/ Publications/Patents

Sl. No	Project	Funding agency	Fund sanctioned/ Approved/ Ongoing	Project Period
1	Role of glutamate receptors and the associated signaling pathways in Epstein-Barr virus (EBV/ HHV-4) mediated oncogenesis.	DBT-RLF	5,95,550/- (Ongoing)	2016-23
2	Identification and characterization of a functional cellular receptor for Kyasanur forest disease virus entry.	DST-SERB	73,42,000/- (approved)	2023-26
3	Dengue virus pathogenesis in megakaryocytes.	DST-INSPIRE	35,00,000/- (Ongoing)	2017-22
4	Synthesis of polyhydroxylated pyrrolidine imi-nocyclitol-based novel antivirals against Dengue Virus.	ICMR	33,20,000/- (sanctioned)	2023-26
5	Construction of Universal Single Pot Human anti-body libraries from Indian donors.	DST-SERB	31,00,000/- (sanctioned)	2022-24

Public Health Initiatives

The Molecular Diagnostic Facility of the Institute carries out viral outbreak investigations as part of the public health initiatives:

Sl. No	Investigation	Date	Area
1	Hand Foot and Mouth disease virus (HFMD)	13.05.2022-27.07.2022	Thiruvananthapuram district
2	Hepatitis virus	31.10.2022	Beach sub-centre area Poovar, TVM
3	Dengue virus	03.11.20222 and 09.11.2022	Kollam municipal corporation area division III
4	Fever with Acute Encephalitis Syndrome (AES)	23.03.2023	FHC Alappad, Kollam

Review meetings

The review of the activities of the Institute was carried out on 16.08.2022 by a committee consisting of the following members:

1	Shri. M.C. Dathan, Mentor (Science), Govt. of Kerala & Former Director, VSSC, Thiruvananthapuram	Member
2	Prof. K.P. Sudheer, Principal Secretary, Science & Technology Department, Govt. of Kerala and Executive Vice President, KSCSTE, Thiruvananthapuram	Member
3	Major. Dinesh Bhaskaran, Additional Private Secretary to Chief Minister	Member
4	Joint Secretary, Science & Technology Department, Govt. of Kerala	Member

Management Committee

A management committee consisting of following members was constituted by the Government to manage the affairs of the Institute till constitution of the Executive Committee as per the Rules and Regulations of the Institute.

The composition of the Management Committee were as follows:

1	Director, Institute of Advanced Virology (IAV)	Chairman
2	Dr. T.R. Santhosh Kumar, Scientist G, RGCB	Member
3	Dr. G. Srinivas, Scientist G & Acting Head, Department of Biochemistry, SCTIMST	Member
4	Joint Secretary, Science & Technology Department, Government of Kerala	Member
5	Administrative Officer, Institute of Advanced Virology (IAV)	Member-Convenor
6	Dr. Mohanan Valiya Veettil, Senior Principal Scientist, Institute of Advanced Virology (IAV)	Nominee- Scientific Staff
7	Mr. Nithin Besent, Technical Officer, Institute of Advanced Virology (IAV)	Nominee- Technical Staff

The meetings of the Management Committee were held on 09.07.2022 and 25.10.2022. Subsequent to constitution of the Executive Committee of the Institute as per the clause 6 of the Rules & Regulations of the Institute, the Management Committee ceases to exist.

Technical Committee

The composition of the technical committee of the Institute are as follows:

1	Director, Institute of Advanced Virology (IAV)	Chairman
2	Shri. M Sathiyan, Executive Engineer, PMSSY Project Division, CPWD, Thiruvananthapuram	Member (Civil)
3	Shri. Revindran M, Retd. Executive Engineer (Electrical), CPWD & Project Engineer (E), IIT Palakkad	Member (Electrical)
4	Shri. Shaj Upendran, Engineer "F" & Acting Head, Division of Clinical Engineering, SCTISMT, Thiruvananthapuram	Member (Bio-engineering)
5	Dr. Rajesh Kumar, Scientist EII, Institute of Advanced Virology (IAV), Thiruvananthapuram	Member
6	Administrative Officer, Institute of Advanced Virology (IAV), Thiruvananthapuram	Member- Convenor

The technical committee is constituted as per Rule 10 X of the Rules & Regulations of the Institute to guide the Institute in technical matters related to construction/establishment of facilities. The first meeting of the technical committee was held on 17.03.2023.

Building works committee

The composition of the building works committee of the Institute were as follows:

1	Director, Institute of Advanced Virology (IAV)	Chairman
2	Dr. G Jeenu, Professor, Department of Civil Engineering, College of Engineering (CET), Thiruvananthapuram	Member
3	Shri. Revindran M, Retd. Executive Engineer (Electrical), CPWD & Project Engineer (E), IIT Palakkad	Member
4	Shri. Shaj Upendran, Engineer "F" & Acting Head, Division of Clinical Engineering, SCTISMT	Member
5	Dr. Rajesh Kumar, Scientist EII, Institute of Advanced Virology (IAV)	Member
6	Administrative Officer, Institute of Advanced Virology (IAV)	Member- Convenor

The meetings of the Building Works Committee were held on 09.07.2022 and 25.10.2022.

Subsequent to constitution of the Technical Committee of the Institute as per the clause 10 X of the Rules & Regulations of the Institute, the Building Works Committee ceases to exist.

Institutional Biosafety Committee (IBSC)

IBSC members of IAV are as follows

1	Dr. E Sreekumar, Director, Institute of Advanced Virology (IAV)	Chairman
2	Dr. John Bernet Johnson, Scientist EI, RGCB, Thiruvananthapuram	DBT Nominee
3	Dr. Aswathyraj S, Scientist C, Institute of Advanced Virology (IAV)	Member Secretary
4	Dr. Satish Mundayoor, Honorary Consultant, Inter University Centre for Biomedical Research (IUCBR), Kottayam	Outside Experts
5	Dr. Sarada Devi K L, Rtd. Professor & Department, Microbiology, Government Medical College, Thiruvananthapuram	Biosafety Officer
6	Dr. Binod Kumar, Scientist EII, Institute of Advanced Virology (IAV)	Internal Expert
7	Dr. Mohanan Valiya Veettil, Senior Principal Scientist, Institute of Advanced Virology (IAV)	Internal Expert

Institutional Human Ethics Committee (IHEC)

The Department of Health Research, Ministry of Health & Family Welfare approved IHEC of IAV on 22.02.2023 with the following members.

1	Prof. (Dr.) Lalitha Kailas, Sree Gokulam Medical College and Research Foundation, Thiruvananthapuram	Chairman
2	Dr. Rajesh Kumar, Institute of Advanced Virology (IAV)	Basic Medical Scientist
3	Prof. (Dr.) Sankar V H, SAT Hospital, Govt. Medical College, Thiruvananthapuram	Clinician
4	Prof. R Lekshmi, University of Kerala (UoK), Thiruvananthapuram	Social scientist
5	Rtd. Prof. Jameela Begam, University of Kerala (UoK), Thiruvananthapuram	Lay Person
6	Mr. Pramod J Dev, Dev and Dev Legal Consultants, Ernakulam	Legal expert
7	Mr. Vinod S, Institute of Advanced Virology (IAV)	Supporting staff
8	Ms. Shilpa Ravindran, Institute of Advanced Virology (IAV)	Supporting staff
9	Dr. Binod Kumar, Institute of Advanced Virology (IAV)	Member Secretary & Basic Medical Scientist (Dual Role)

Standing purchase committee

The members of the standing purchase committee are as follows.

1	Dr. Rajesh Kumar, Scientist EII, Institute of Advanced Virology (IAV)	Chairman
2	Dr. Anismrita Lahon, Scientist C, Institute of Advanced Virology (IAV)	Member
3	Mr. Renjith R S Nair, Section Officer, Institute of Advanced Virology (IAV)	Member
4	Mr. Nithin Besent N, Technical Officer- Engineering Support, Institute of Advanced Virology (IAV)	Member
5	Ms. Fathima Zahra C, Technical Officer-Laboratory and Project Management, Institute of Advanced Virology (IAV)	Member
6	Mr. Johney Philip, Technical Officer, Purchase Section (i/c), Institute of Advanced Virology (IAV)	Member

Institute purchase committee

The members of the institute purchase committee are as follows:

1	Dr. Mohanan Valiya Veettil, Senior Principal Scientist, Institute of Advanced Virology (IAV)	Chairman
2	Dr. Binod Kumar, Scientist E II, Institute of Advanced Virology (IAV)	Member
3	Mr. Manoj Kumar, Administrative Officer, Institute of Advanced Virology (IAV)	Member
4	Shri. Jayakrishnan N, Senior Manager (Purchase), Rajiv Gandhi Centre for Biotechnology (RGCB)	Member
5	Mr. Johney Philip, Technical Officer, Purchase Section (i/c), Institute of Advanced Virology (IAV)	Member

Visitors

Shri P. Rajeev, Minister for Industries, Law and Coir, Government of Kerala

Officials from Chief Minister's Secretariat

Vice Chairman, Kerala State Planning Board

Vice Chancellor, Kerala University of Health Science (KUHS)

Prof. N K Ganguly, Former DG, ICMR

Prof. Venugopal Nair, Pirbright Institute, United Kingdom (UK)

Dr. Saurabh Chattopadhyaay, Professor Associate, University of Toledo, United States of America (USA)

Prof. Carl- Henrik Heldin, Chairman of the Board of the Nobel Foundation, Director of Ludwig Cancer Foundation, Uppsala

Details of Human Resource (Staff)

Scientists:

Name of Scientist	Designation
Dr. E Sreekumar	Director
Dr. MohananValiyaVeettil	Senior Principal Scientist
Dr. Binod Kumar	Scientist EII
Dr. Rajesh Kumar	Scientist EII
Dr. Anismrita Lahon	Scientist C
Dr. Aswathyraj S	Scientist C

Administrative staff:

Mr. Manoj Kumar S,
Administrative Officer

Mr. Renjith R S Nair,
Section Officer

Technical Staff:

Name of Staff	Designation
Mr. Johney Philip	Technical Officer
Mr. Nithin Besent N	Technical Officer-Engineering Support
Mr. Vinod S	Technical Officer-Technical Support
Ms. Fathima Zahra C	Technical Officer- Laboratory and Project Management
Ms. Sreeja S	Technical Officer- Molecular Diagnostic Support
Ms. Shilpa Ravindran	Technical Assistant
Mr. Arun V Jose	Technical Assistant
Mr. Gopikrishnan K	Technical Assistant - Core Instrumentation Facility

Research Departments

1. Department of Viral Diagnostics

The Department of Viral Diagnostics is primarily focusing on the development of new diagnostics tools for emerging viruses and also improving diagnostics for already existing virus infections. The department is also collaborating with the clinical departments of various hospitals across the state of Kerala in validating and translating the new leads into clinically useful products. The department has a molecular biology laboratory and a cell culture facility.

a. Scientist in charge: Dr. Aswathyraj S

b. Designation: Scientist C

Dr. Aswathyraj completed MSc in Clinical Virology and PhD in Virology from Manipal Institute of Virology, Manipal Academy of Higher Education, Karnataka. She served as a senior research officer at the Manipal Institute of Virology and also worked as a Research Associate at Inter-University Centre for Biomedical Research and Super Speciality Hospital (IUCBR & SSH). Her research interests are public health aspects of Virology, emerging and remerging viral diseases, diagnostic virology, epidemiology of viral diseases, public health response during infectious disease outbreaks, and translational Virology, including development of virus diagnostic assays.

c. Research project:

Flagship project: New Generation Multiplex Diagnostic Platforms against Viral Syndromes causing Acute Febrile Illness in Kerala.

Team Members

Sl No.	Name	Designation	Qualification
1	Dr. Aneesh B	Project Scientist I	MSc, PhD
2	Ms. Chippy P. S	Project Associate I	MSc
3	Ms. Megha Chandran	Project Associate I	MSc

Collaborations

- Micro/nanofluidics Research Laboratory, Department of Mechanical Engineering, College of Engineering, Thiruvananthapuram.
- Department of Paediatrics, Sree Gokulam Medical College & Research Foundation, Venjara moodu, Thiruvananthapuram.
- Department of Paediatric Neurology, SAT Hospital, Thiruvananthapuram.

Conferences/Seminars/Workshops participated by faculty or students

1. Aneesh B., Megha Chandran, Aswathyraj S. E. Sreekumar. Molecular Epidemiology of Entero virus Associated Diseases in Kerala. Poster presented at the 35th Kerala Science Congress, from 10th-14th February 2023 at Mar Baselios Christian College of Engineering, Kuttikka nam, Idukki.

2. Dr. Aneesh B. participated as a resource person in the International Training Workshop on DNA Barcoding & Molecular Taxonomy held at the School of Marine Sciences, Cochin University of Science and Technology, Cochin, from 11th to 16th July 2022.

3. Dr. Aneesh B. participated at the ISIRV Respiratory Virus School at Christian Medical College, Vellore, from 14th-18th November 2022.

4. Ms. Chippy P. S. participated at the ISIRV Respiratory Virus School at Christian Medical College, Vellore, from 14th-18th November 2022.

5. Ms. Megha Chandran participated at the ISIRV Respiratory Virus School at Christian Medical College, Vellore, from 14th-18th November 2022.

Student Trainings

Sl.No	Name	Type of training	Status
1	Ms. Merin Maryson	Dissertation	Completed
2	Ms. Ruksana Safyan Khan	Volunteer trainee	Completed

2. Department of Viral Vaccines

The department of Viral Vaccines aims to develop new generation vaccines against emerging viruses, viruses of critical concern as well as endemic viruses of regional importance. The vaccines thus developed will be validated in suitable animal models, further these vaccines will undergo efficacy, safety and immunogenicity studies prior to clinical use. The department is equipped with a cell culture facility and molecular biology laboratory where extensive molecular and immunology-based research activities are being performed.

a. Scientist in charge: Dr. Anismrita Lahon

b. Designation: Scientist C

Dr. Anismrita received her PhD from the National Institute of Virology, Pune in 2014. Her doctoral research focused on rotavirus infection in humans and animals. Later, she joined Prof. Rebecca Rico-Hesse as a post-doc (2014-2017) at Baylor College of Medicine, USA and studied humanized mouse models of flavivirus and mosquito saliva induced immune response. In 2017, she joined NII, New Delhi as DST-INSPIRE Faculty and uncovered many viral and host factors associated with dengue virus pathogenesis. Her research is centered on developing nucleic acid-based vaccines for Zika and Chikungunya viruses.

c. Research project:

Flagship project: Development of DNA vaccine for Zika and Chikungunya virus.

Other Research:

- Study on the role of both host and viral factors in megakaryocyte development, maturation, and platelet production in DENV infection.
- So far, we have uncovered the mechanism of dysregulation of crucial molecules (PI3K/AKT/mTOR and terminal maturation factors, i.e., GATA-1, GATA-2, NF-E2) responsible for megakaryocyte development and maturation during dengue virus infection.

Publications/Patents/Awards

Publications:

Sl. No.	Authors	Publication details	Research paper/review/ book chapter	Published/ communi-cated
1	Ravindran Shilpa and Anismrita Lahon	Tropism and immune response of Chikungunya and Zika viruses: an overview.	Review	Under Review

Team Members

Sl No.	Name	Designation	Qualification
1	Ms. Shilpa Ravindran	Technical Assistant	MSc
2	Dr. Athira A P	Project Scientist I	MSc, PhD
3	Ms. Anjali C J	Project Associate I	MSc

Conferences/Seminars/Workshops participated by faculty or students

1. Ms. Anjali C.J attended the two-day workshop on "Monoclonal Antibodies, an emerging era in biological: Principles of production, applications in immunodiagnostics and therapeutics 8th & 9th December 2022.

2. Dr. Athira A.P attended the two-day workshop on "Monoclonal Antibodies, an emerging era in biological: Principles of production, applications in immunodiagnostics and therapeutics 8th & 9th December 2022.

Student trainings

Sl No.	Name	Type of training	Status
1	Mr. Sajith S. K	Dissertation	Completed
2	Ms. Shehina M. S	Dissertation	Completed
3	Ms. Amina A	Dissertation	Completed
4	Ms. Neeraja P.M	Volunteer trainee	Ongoing
5	Ms. Megha P. S	Dissertation	Ongoing

3. Department of Antiviral Drug Research

The Department of Antiviral Research (DAV) is engaged in conducting innovative research for identification and development of antiviral drugs that acts either by directly targeting the essential viral components or modulation of the host components to restrict viral infections. The department also conducts research on virus-host interactions to elucidate mechanisms of viral entry, trafficking, assembly, egress and associated cellular signalling to identify crucial drug targets and develop broad spectrum antiviral strategies against a wide range of emerging and remerging viral infections. The department is currently equipped with an established cell culture laboratory with basic equipment such as centrifuges, BSL2 cabinets, a CO2 incubator, conventional PCR machine and few other minor equipment.

a. Scientist in charge: Dr. Binod Kumar

b. Designation: Scientist EII

Dr Binod's Doctoral research was based on the epidemiology, and development of nucleic acid-based antiviral strategies against human Influenza viruses. Post-doctoral training was based on the mechanistic studies in the area of viral entry & trafficking induced host cellular signalling and associated innate immune responses against herpes viruses, hepatitis viruses, and human coronaviruses.

c. Research project:

Flagship Project: Studies on virus-host proteome interactions and discovery of antiviral targets against severe acute respiratory syndrome coronavirus 2 (SARS-CoV2).

Other Research:

- The department is also engaged in developing potential antiviral drugs against influenza viruses.
- Preliminary computational data have been generated to identify potential blockers to inhibit influenza virus infection.

Publications/Patents/Awards

Awards: Dr. Binod Kumar got selected as "Global assessor" for the "Royal Society of Tropical Medicine and Hygiene", London.

Publications:

Sl. No.	Authors	Publication dtails	Research paper/ review/book chapter	Published/ communicated
i	Becatti M, Dmello C, Kumar B	Editorial: Exploring circular RNAs and their applications within health and disease. Front. Mol. Biosciences. doi: 10.3389/fmolb.2023.1145738	Research paper	Published
ii	Asha K, Meseko CA, Kumar B	Editorial: Influenza and Related Viruses: Epidemiology, Pathogenesis and Therapeutics. Front. Mol. Biosciences. doi. org/10.3389/fmolb.2022.1117067	Review	Published
iii	Lekshmi VS, Asi A, Arya UM, Kumar B	Cellular signaling and virus-host interactions:Anupdate on the potential therapeutic management of SARS-CoV-2 infection.Frontiers in Molecular Biosciences 2023.	Review	Published
iv	Meseko CA, Sanicas M, Sulaiman L, Asha K, Kumar B	Antiviral options and therapeutics against influenza: History, latest developments and future prospects.	Review	Under Review
V	Meseko CA, Ameji NO, Kumar B	Rational Approach to Vaccination Against Highly Pathogenic Avian Influenza in Nigeria: A Scientific Perspective and global best practice	Review	Under Review

Team Members

Sl No.	Name	Designation	Qualification
1	Dr. Lekshmi V S	Project Scientist I	Msc, PhD
2	Ms. Abhila Asi	Project Associate I	MSc
3	Ms. Farha Salim	Project Associate I	MSc
4	Ms. Arya U M	Project Assistant	BSc

Collaborations

- Collaboration with Dr. Mohanan Valiya Veettil from Dept. of General Virology, IAV. Co-investigator in SERB project titled "Identification and characterization of a functional cellular receptor for Kyasanur Forest Disease virus entry" funded for 3 years with financial support of Rs 72 Lakhs.

Conferences/Seminars/Workshops participated by faculty or students

1. Dr. Binod Kumar was a member of the technical programme committee of 7th International Confer ence on Pharmacy and Pharmaceutical Science 2022 conference; April 20-23, 2022; Tokyo, Japan.

2. Dr. Binod Kumar attended the ePanel on Climate Change & Infectious Disease Threats" organized by the Keystone Symposia, USA on December 14, 2022.

3. Dr. Binod Kumar was the Co-convenor and session chair in a two-day workshop on "Monoclonal Antibodies, an emerging era in biological: Principles of production, applications in immuno-diagnostics and therapeutics 8th & 9th December 2022.

4. Dr. Binod Kumar attended the ISIRV-Respiratory Virus School organized by the Christian Medical College, Vellore, India from 14th-18th November 2022.

5. Dr. Binod Kumar delivered an invited lecture in two days national workshop on "Diagnostic Cytoge netics" organized by Department of Zoology, University college, Thiruvananthapuram.

6. Scholars from the department (Dr. Lakshmi VS, Abhila Asi, Arya U M and Farha Salim) participated in ISIRV Respiratory Virus School held at Christian Medical College, Vellore, India, from the 14th-18th November 2022.

7. Scholars from the department (Dr. Lakshmi VS, Abhila Asi, Arya U M and Farha Salim) attended the two-day workshop on "Monoclonal Antibodies, an emerging era in biological: Principles of production, applications in immunodiagnostics and therapeutics 8th & 9th December 2022.

Sl No.	Name	Type of training	Status
1	Ms. Neeraja S. Raj	Dissertation	Completed
2	Ms. Deepthi J.S.	Dissertation	Completed
3	Ms. Bhagi S. Parvathy	Volunteer trainee	Ongoing
4	Ms. Gayathri P Nair	Volunteer trainee	Ongoing
5	Ms. Megha. B	Dissertation	Completed

4. Department of Virus Application

Monoclonal antibody (mAb) based therapeutics have shown tremendous success in the field of cancer therapy and immune disorders but have shown limited success against viral targets. Neutralizing antibodies, on the other hand, play an important role in antiviral immunity, and humoral immune responses primarily mediate human protection against viral infections. This gap provides an opportunity for robust, low-cost antibody discovery and development against disease targets that affect a substantial proportion of the world's population, with the goal of achieving public health impact. A robust antibody discovery platform can serve as the cornerstone for initiatives in vaccine creation and diagnostics, in addition to therapeutic or preventive uses of antibodies.

a. Scientist in charge: Dr. Rajesh Kumar

b. Designation: Scientist EII

Dr. Rajesh has expertise in the field of monoclonal antibody-based therapeutic development. He has successfully isolated human monoclonal antibodies against SARS-CoV-2, which implies the application of generated mAbs, as valuable reagents for accessing the antigenicity of vaccine candidates and developing alternative therapeutic modalities for passive prophylaxis and targeting escape mutants of SARS-CoV-2. His research interest focus on the development of Antibody-Based Therapeutic Interventions for Emerging and Re-emerging viral disease.

c. Research project:

Flagship project: Recombinant Antibody Engineering & Therapeutic Centre (RAET): Development of therapeutic modalities for Chikungunya, ZIKA and other emerging viruses.

Other Research:

- Construction of single-pot universal human, Camelid and shark nanobody libraries.
- To characterize the epitopes of mAbs that show the greatest breadth and potency.
- To test the therapeutic and prophylactic potential of mAbs in small animal models.
- Developability of selected mAbs candidates showing promising results in pre-clinical studies.

Publications/Patents/Awards

Publications:

Sl. No.	Authors	Publication details	Research paper/ review/book chapter	Published/ communicated
i	Vanshika Singh, Sonal Garg, Nisha Raj, Asha Lukose, Deepti Jamwal, Reshma Perween, SamridhiDhyani, Hilal Ahamed Parray, Chandresh Sharma, Rajesh Kumar*	Protocol for High Throughput Screening of Antibody Phage Libraries, Bio-Protocol 2022, Vol 12, Iss 12, June 20, DOI: 10.21769/BioProtoc.4450	Research paper	Published
ii	Sonal Garg, Nisha Raj, Asha Lukose, Deepti Jamwal, Hilal Ahmed Parray, Sandeep Anand, SamridhiDhyani, Kamini Jakhar, Sudipta Sonar, Mahima Tiwari, Reema, Shailendra Mani, Sankar Bhattacharyya, Chandresh Sharma, Tripti Shrivastava, Rajesh Kumar	Characterization of a broadly cross-reactive tetravalent human monoclonal antibody, recognizing conformational epitopes in receptor binding domain of SARS-CoV-2. 3 Biotech, August 2022, doi.org/10.1007/s13205-022-03272-6	Review	Published

Team Members

Sl No.	Name	Designation	Qualification
1	Ms. Karthika. S. Nair	Project Associate I	MSc
2	Ms. Meenakshi Mohan S	Project Associate I	MSc
3	Dr. Santhik S. L	Project Scientist I	MSc, PhD
4	Dr. Priya P	Project Scientist I	MSc, PhD
5	Ms. Asha Lukose	Project Associate I	MSc
6	Mr. Vivek K Yadav	Principal Project Associate	MSc

Collaborations

- Dr. Ramanathan Natesh, Associate Professor, IISER Thiruvananthapuram.
- Dr. Santosh Kumar, Principal Scientist, from Central marine and fisheries research centre, Thiruvananthapuram.
- Drs. Guruprasad Medigeshi and Supartik Das, Translational Health Science and Technology Institute, Faridabad.

Conferences/Seminars/Workshops participated by faculty or students

1. Dr. Rajesh attended State Level Workshop on NIPAH-Kerala Experiences & Learning 11-12 May 2022.
2. Dr. Rajesh delivered invited talk in AVRS conference held in Madurai 25-26 May 2022.
3. Three scholars from the department (Meenakshi Mohan S, Santhik S.L, Priya P.) participated in ISIRV Respiratory Virus School held at Christian Medical College, Vellore, India, from the 14th-18th November 2022.
4. Poster presentation under Health Sciences category at 35th Kerala Science Congress held on 10-14 February 2023, Idukki.

- Poster 1: Expression, Purification, and Characterization of Zika NS1 antigen. Priya P, Aneesh B, Meenakshi Mohan S, Dilip Kumar, Aswathy Raj S, Rajesh Kumar.
- Poster 2: High Yield Production and Purification of Recombinant West Nile Virus NS1 Protein. Meenakshi Mohan S, Rajesh Kumar.
- Poster 3: A Simplified High through-put Pseudo virus Neutralization assay to evaluate the immune response to Rabies virus. Santhik SL, E Sreekumar, Rajesh Kumar.

Sl No.	Name	Type of training	Status
1	Ms. Tesna Daison	Dissertation	Completed
2	Ms. Kajal John	Dissertation	Completed

5. Department of General Virology

The Department of General Virology carries out high-end research in various aspects of basic virology including, viral disease mechanisms, virus-host cell interactions and viral immunology. Any advances in understanding biochemical and molecular events occurring within virus infected cells would yield important new insights into the causes of viral diseases. Presently, the department focuses on emerging and re-emerging viruses and oncogenic virus research. The department is also dedicated to providing opportunities to specialize in molecular virology for doctoral and post-doctoral researchers in virology.

a. Scientist in charge: Dr. Mohanan Valiya Veettil

b. Designation: Senior Principal Scientist

Dr. Mohanan earned his Ph.D. in Biotechnology from Cochin University of Science and Technology, Kerala, in 2005. He completed his post-Doctoral studies in virology at University of Kansas Medical Centre and at Chicago Medical School, Rosalind Franklin University of Medicine and Science, USA. Following his post-doctoral studies, he served as an Assistant Professor (Research) and Associate Member of the School of Graduate and Postdoctoral studies in the Department of Microbiology and Immunology at Chicago Medical School, Rosalind Franklin University of Medicine and Science, USA. He returned to India in 2016 and joined Cochin University of Science and Technology, Department of Biotechnology as DBT-Re-Entry Faculty.

c. Research project:

Flagship project: Development of neutralising and diagnostic monoclonal antibodies for Nipah virus infection

Other Research:

- Epstein-Barr virus (EBV), also called the human herpes virus-4 (HHV-4),isassociated with a series of cancers such as the nasopharyngeal carcinoma, Burkitt's lymphoma, Hodgkin's lymphoma and post transplantation lymphomas.
- The interaction of EBV latent viral proteins such as Epstein Barr virus nuclear antigens (EBNAs), latent membrane proteins (LMPs) and Epstein Barr virus encoded small RNA (EBERs) with the host cellular molecules trigger the development of EBV associated cancers.
- Since glutaminase and glutamate receptors are major component in host cellular metabolism, analysis of the glutamate levels, glutamate receptor expression and glutamate transporters in the EBV infected cancer lymphoma cell and nasopharyngeal carcinoma cells are determined in this study.

- The expression of glutaminase 1 or GLS1, and other mitochondrial enzymes, mitochondrial metabolites associated with glutamine metabolism such as alpha ketoglutarate and TCA cycle intermediaries, and their role in proliferation and viability are also examined in the infected cells.
- In addition to this, regulation of glutamate receptor gene expression and genome maintenance by glutamate receptors and their transcriptional regulator RE1-silencing transcription factor is a new topic of EBV-associated cancer research in order to understand the biology of EBV infected cells and to develop effective treatment for EBV associated cancers.

Publications/Patents/Awards

Publications:

Sl. No.	Authors	Publication details	Research paper/review/book chapter	Published/ communicated
i	Gayathri Krishna, Vinod Soman Pillai, Poornima Gopi, MohananValiyaVeettil	Epstein-Barr virus infection controls the intracellular antioxidant glutathione by upregulating the expression of glutamate transporter EAAT3. 59(1):55-66. Virus Genes. 2023	Research paper	Published
ii	Poornima Gopi, T R Anju, Vinod Soman Pillai, Mohanan ValiyaVeettil	SARS-Coronavirus 2, A Metabolic Reprogrammer: A Review in the Context of the Possible Therapeutic Strategies. Current drug targets.23 (8):770-781. 2022.	Review	Published
iii	Arathi Rajan, Anuja S Nair, Vinod Soman Pillai, Mohanan Valiya Veettil	Nipah virus: A threat to public health. Advances in life sciences. 1 (2), 2022	Web article	Published
iv	Poornima Gopi, Gayathri Krishna, Mohanan ValiyaVeettil	Biology of Variola Virus	Book chapter	Communicated

Team Members

Sl No.	Name	Designation	Qualification
1	Mr. Vinod S	Technical officer-Technical Support	MSc
2	Dr. Arathi Rajan	Project Scientist I	MSc, PhD
3	Ms. Bimitha Benny	Project Associate I	MSc

Collaborations

- Collaboration with Dr. Binod Kumar from Dept. of Antiviral Drug Research, IAV in SERB project titled "Identification and characterization of a functional cellular receptor for Kyasanur Forest Disease virus entry".

Conferences/Seminars/Workshops participated by faculty or students

1. Poornima Gopi, Gayathri Krishna, Vinod Soman Pillai, MohananValiyaVeettil. Oral presentation on "NHE1 regulates proliferation and viability of Epstein-Barr virus infected cancer cells" atInternational Conference-BIOTECHSPECTRUM 2022, CUSAT.

2. Vinod Soman Pillai, Gayathri Krishna, MohananValiyaVeettil "Neuron restrictive silencer factor regulates EBV life cycle in EBV-associated cancer cells "Oral presentation at the National Conference on Recent Trends in Biology at the Department of Botany &Biotechnology, Newman College, Thodupuzha, 2022.

3. MohananValiyaVeettil gave invited talk at the Workshop on monoclonal antibodies production and applications IAV, Thiruvananthapuram, Monoclonal antibodies in therapeutic in a special context to viral infections, 2022.

4. MohananValiyaVeettil gave invited talk at National seminar on "Recent trends in disease prevention and health management". CSIR-NIIST, Thiruvananthapuram, Antivirals and antiviral strategies to treat viral infectious diseases, 2022.

5. Vinod S, attended as an invitee at the Frontier Symposium in Biology 2023 from 17th -19th March 2023 held at IISER, Thiruvananthapuram.

Student trainings

Sl No.	Name	Type of training	Status
1	Ms. Anuja S Nair	Project Associate	Completed
2	Mr. Aswin S Kumar	Dissertation	Completed
3	Mr. Suneesh Radhakrishnan	Dissertation	Ongoing
4	Ms. Sreelakshmi S S	Volunteer trainee	Ongoing

1. Molecular Bioassay Facility

Molecular Bioassay Laboratory focuses on developing platform assays for virus neutralization as well as antiviral screening. Both virus targeted assays as well as host-antiviral gene/protein-targeted assays are being developed. At present assays are being developed against a panel of viruses in the Flaviviridae. Subsequently, this will be extended to viruses of public health importance that belong to other families. Among the host proteins that mediate antiviral activity, the institute focus on interferon-stimulated genes (ISGs); and develop assays to identify their modulators.

a. Scientist in charge: Dr. E. Sreekumar

b. Designation: Director, IAV

Dr. Sreekumar's area of research includes development of host-directed antivirals against dengue, chikungunya, zika and other emerging viruses. He has 19 years of experience in the field of molecular virology focusing on emerging viruses.

c. Research project:

Flagship project: Development of broad-spectrum, host-directed antivirals against Emerging Viruses.

Publications/Patents/Awards
Publications:

Sl. No.	Authors	Publication details	Research paper/review/ book chapter	Published/ communicated
i	Sagna A, Nair RVR, Hulyalkar N, Rajasekharan S, Nair VTG, Sivakumar KC, Suja SR, Baby S, Sreekumar E	Ethyl palmitate, an anti-chikungunya virus principle from Sauropusandrogynus, a medicinal plant used to alleviate fever in ethnomedicine J Ethnopharmacol. 2023 Jun 12; 309:116366. doi:10.1016/j.jep.2023.116366.	Research paper	Published
ii	Nair SR, Abraham R, Sreekumar E.	Generation of a Live-Attenuated Strain of Chikungunya Virus from an Indian Isolate for Vaccine Development. Vaccines (Basel). 2022 Nov 16;10(11):1939. doi: 10.3390/vaccines10111939.	Research paper	Published

Team Members

Sl No.	Name	Designation	Qualification
1	Ms. Sreeja S	Technical Officer	BSc
2	Mr. Vivek Vijay	Project Associate I	MSc

Collaborations

- Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram.
- CSIR-National Institute of Interdisciplinary Sciences and Technology (CSIR-NIIST), Thiruvananthapuram.

Conferences/Seminars/Workshops participated by faculty or students

1. Invited talk; E. Sreekumar; Evading Epidemic Virus Invaders: Empowering the Human Host. Nation al Seminar; 27th July2022; Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram.

2. Invited talk; E. Sreekumar; Host factors restricting Chikungunya virus infection; 'IUBMB focused meeting on Biochemistry & Molecular Biology of RNA viruses' organized at Regional Centre for Biotechnology, Faridabad, India during 15-18 November, 2022.

Student trainings

Sl No.	Name	Type of training	Status
1	Ms. Minju Sara Simon	Voluntary Trainee	Ongoing

2. Molecular Diagnostics Facility (MDF)

a. Scientist in charge: Dr. Aswathraj S

b. Designation: Scientist C

The Molecular Diagnostic Facility is focused on detecting and diagnosing a wide spectrum of both chronic and acute illness viruses as well as associated viral diseases. The Facility is well equipped and fully functional with all classical virological systems and the state-of-the-art molecular diagnostic virology facility up to nucleic acid sequencing level. Presently the facility has the capacity to diagnose 83 types of viruses/viral diseases such as vector-borne disease viruses; viruses transmitted by the respiratory route, by intestinal route, by body fluids; acute encephalitis syndrome causing viruses, zoonotic disease viruses and viruses of travel & tourism significance, employing both conventional and molecular methods. The laboratory is closely attached to PHCs, CHCs, FHCs, and Medical Colleges under the state health department.

Apart from routine diagnosis reports generation and communication, the facility conducts early outbreak detection and implementation of effective control measures in close collaboration with the state health department, thereby aiming to help strengthen the public health system and pandemic preparedness. The facility is also equipped to conduct a variety of scientific activities such as molecular epidemiology research, validation as well as the development of diagnostic kits, advanced virus diagnostic training, and medical virology research in collaboration with clinical departments of medical colleges and other research centers. The facility provides diagnostic support to the government and private hospitals and is envisaged to become a referral facility in the state.

MDF is actively involved in the diagnosis of various virus pathogens from patient samples collected from all over Kerala. At present clinical samples from more than 50 Government Hospitals of Kerala are being diagnosed at MDF, and the reports are communicated to the respective clinicians within 24 hrs. It maintains a good link with the district surveillance program and provides useful information to initiate public health action.

Main objectives of the facility:

- To establish a referral diagnostic virology testing facility for viral isolation, viral antigen detection, viral serology, and molecular diagnostic virology, including sequencing, to identify viral diseases of regional and national importance.

- To conduct scientific activities, including outbreak investigations, research, and training in virology.

Laboratory diagnosis of viral infections

All diagnostic techniques used in virology are based on the detection of virus antigens, the detection of viral nucleic acid, or by the detection of virus-specific antibodies. The choice of the system used in the laboratory for confirmation or ruling out of a viral infection would primarily depend on the type of virus to be identified and the facilities or resources available.

Laboratory Diagnosis:

The following techniques are used for the diagnosis of virus infection. In order to obtain a confirmation diagnosis, one or two techniques are used together.

a. Viral Serology (Antibody detection)

Serology is the mainstay in the rapid diagnosis of many viral diseases. We use antibody detection kits for the detection of specific IgM antibodies for Dengue, Japanese Encephalitis, West Nile, Chikungunya, Zika, Measles, Rubella, Mumps, Varicella zoster virus, & Hepatitis A, B, E.

b. Viral antigen detection (Rapid Diagnosis by ELISA)

Direct detection of viral antigens in clinical samples is an accepted rapid diagnostic technique. This is also used to confirm virus isolation in cell culture. Soluble viral antigens in clinical specimens are detected using ELISA and Lateral Flow Assays.

c. Molecular diagnostic Virology

PCR/RT-PCR/Real-Time PCR/ Real-Time RT-PCR Detection of viral nucleic acids directly from the clinical samples is the most sensitive and often specific method for laboratory diagnosis of viral diseases. Viral DNA/ RNA is extracted from various clinical samples using a manual/automated RNA/DNA extraction system. Coventional Polymerase chain reaction (PCR), Reverse Transcriptase PCR, and Real-Time PCR are made for tesing clinical samples, whichever is applicable.

d. Virus isolation

Tissue/cell culture is the method used for isolating viruses in this laboratory. After careful assessment of epidemiological and clinical data, an algorithm is drawn for selection of cell lines. One aliquot of the sample in a viral transport medium is processed as per established procedures and inoculated into various cell lines as per the protocol. Periodically the cells are observed for the development of Cytopathic Effects (CPE). If CPE is developed, the virus etiologic will be confirmed by Antigen detection (Immunofluorescence) or Polymerase chain reaction and sequencing if necessary. If there is no visible CPE, it will be passaged twice before declaring negative.

e. Molecular Diagnostic Virology-Nucleic acid sequencing

Detection of viral nucleic acids directly from the clinical samples is the most sensitive and often specific method for laboratory diagnosis of viral diseases. However, it can be confirmed only when the sequence of the product is verified by using probe hybridization or nucleic acid sequencing. For confir mation of the identity of the virus the PCR products are sequenced wherever required and justifiable. Sequencing of random amplified PCR products is used for the detection of viral etiology in cases of unknown viruses / viral outbreaks.

Fig. 1: Geographic distribution of Hospitals in Kerala connected with Molecular Diagnostic Facility

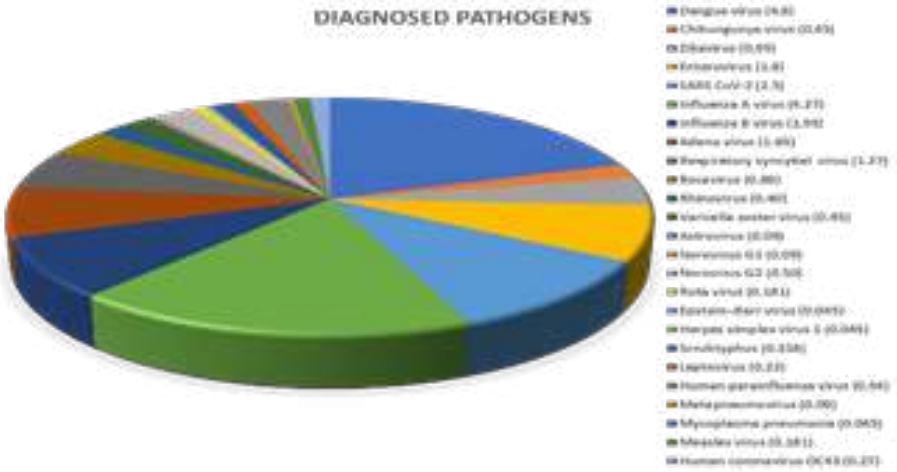


Fig. 2: Representation of pathogens diagnosed from the clinical samples

During the short period since the establishment, the MDF tested around 2207 clinical samples, and 501 of them tested positive. An illustration of the representation of different pathogens diagnosed at the MDF is given as Fig. 2.

The MDF also carried our outbreak investigations during Zika, Dengue, Influenza, Hand, Foot and Mouth Disease, and Hepatitis outbreaks in the Thiruvananthapuram, Kollam, and Alappuzha districts on request from the state health departments.

Team Members

Sl No.	Name	Designation	Qualification
1	Mr. Arun V Jose	Technical Assistant	BSc
2	Ms. Archana T. S	Lab Technician	BSc
3	Ms. Rakhi S	Lab Technician	BSc
4	Ms. Arunima Ratheesh	Technician Apprentice	BSc
5	Ms. Megha P. A.	Technician Apprentice	BSc

3. Core Instrumentation Facility (CIF)

a. Scientist in charge: Dr. Rajesh Kumar

b. Designation: Scientist EII

The core instrumentation facility is the central facility dedicated exclusively for high end and sophisticated machines. The CIF have a wide range of machines to facilitate cutting edge research in Virology and allied subjects. The facility is designed in a way that anyone from the institute can access these instruments according to their convenience. The Core instrumentation facility provides required training and support to the machine users. The users from other institutes can also make use of the facilities.

DNA sequencer

CIF has 3730XL DNA Analyser which is gold-standard Sanger sequencing technology for high-throughput genetic analysis. 96 samples can be analysed simultaneously using the capillary array system. The 3730XL DNA Analyser uses integrated plate stacker to enable up to 48-hour uninterrupted instrument operation or add plates while instrument is running. Automation features help decrease risk of human error, including onboard polymer delivery system, washing and rinsing of the capillary tips, automated sample loading etc.

Model : 3730XL
Make: INVITROGEN BIOSERVICES

Model : OCTET R8
Make : SARTORIOUS

Bio-layer interferometer

Bio-Layer Interferometry (BLI) is an optical technique for measuring macromolecular interactions by analysing interference patterns of white light reflected from the surface of a biosensor tip. BLI experiments are used to determine the kinetics and affinity of molecular interactions. In a BLI experiment, one molecule is immobilized to a Dip and Read Biosensor and binding to a second molecule is measured. A change in the number of molecules bound to the end of the biosensor tip causes a shift in the interference pattern that is measured in real-time.

Model : AXIOVERT
Make : CARL ZEISS

Fluorescence microscope

CIF has a CARL ZEISS Axiovert A1 system. System has 4 different excitation LEDs. With Axio Vert.A1, samples remain safe in gentle with LED light. LED excitation has no unwanted UV component, which will help in significant increase in the survival rate of the cells. This machine provides extremely long-life time of the light source. LED illumination immediately works with full intensity – Its homogeneous in nature and there is no heating and cooling period required. The microscope have wide range of objectives from 5x, 10x, 20x, 40x, 60x. The ZEN software can be used to capture the image of the specimen and also for the post processing of the captured images. There are specialized filters installed in the condenser for better DIC and bright field images.

High pressure homogenizer

Table-top Homogenizers are compact machines ideal for the treatment of nanoparticles, nano dispersions and nano emulsions. The high-pressure homogenizer (HPH) in research labs and the pharmaceutical industry is specifically used for size reduction, mixing, and stabilization of dispersions including macroemulsions, microemulsion, and suspensions. It produces high local stresses that lead to a drastic reduction in particle size.

Model : PANDA PLUS 2000
Make : GEA NIRO SOVAI

High pressure homogenization is a key unit operation in inclusion body processing for protein expression in bacterial system. Recombinant protein production in E. coli often leads to the formation of inclusion bodies (IBs). Although downstream processing of IBs has the reputation of being a great hurdle, advantages of IBs can be substantial and can be used in extraction or preservation of bioactive compounds and phytochemicals.

Model : OPTIMA XPN 100
Make : BECKMAN COULTER

Ultra-Centrifuge

This is one of the most sophisticated centrifuges used for R&D activities. The machine is from BECKMAN COULTER and the model is OPTIMA XPN 100. The highlight of the machine is it can go up to 1 Lakh RPM with the provided rotor. All the controls can be accessed in Full-color LCD touch screen. Set temperature range can be varied from 0 to 40°C in 1°C increments.

Other sophisticated equipment in the facility

Sl No.	EQUIPMENT	MAKE	MODEL
1	REAL TIME PCR	APPLIED BIOSYSTEMS	QUANTSTUDIO 5
2	GEL DOCUMENTATION SYSTEM WITH CHEMILUMINESCENCE	BIO RAD	CHEMI DOC XRS +
3	PLATE CENTRIFUGES	THERMO	ST 8R
4	MULTIMODE READER	PROMEGA	GLOMAX
5	DRY BATH	THERMO	88870004
6	REFRIGERATED MICRO CENTRIFUGE	GYROZEN	GZ-1730R
7	THERMAL MIXER	EPPENDORF	THERMOMIXER C
8	UV TRANS ILLUMINATOR	ANALYTIK JENA	UVP
9	MULTIFUNCTINAL ELECTRO FUSION & ELECTROPORATION UNIT WITH HYBRIDOMA PRODUCTION	BTX HARVARD APPARATUS	ECM-2001 LITE
10	ELISA PLATE READER AND WASHER	BIORAD	PR4100 + PW40

Upcoming facilities:

- Confocal laser scanning microscopy
- Florescence activated cell sorting
- Fast protein liquid chromatography
- Probe sonicator
- UV-Vis spectrophotometer
- Higher end Work stations

Team Members

Sl No.	Name	Designation	Qualification
1	Mr. Gopikrishnan K	Technical Assistant	B.Tech

List of other Major equipment

Sl No.	Name of equipment	Quantity
1	Thermal Cycler	7
2	RT PCR	4
3	Refrigerated Micro Centrifuge	6
4	Refrigerated Centrifuge	12
5	Biosafety Cabinet	19
6	Freezer (-20 Degree)	9
7	CO2 Incubator	6
8	Liquid Nitrogen Deewar	12
9	Shaker Incubator	4
10	CO2 Shaker Incubator	1
11	Deep Freezer (-80 Degree)	8
12	Incubator	1
13	Elisa Reader and Washer	1
14	Automated Extraction Machine	1
15	Autoclave	1

List of other Minor equipment

Sl No.	Name of equipment	Quantity
1	Vortex Mixer	10
2	Magnetic Stirrer with Hotplate	4
3	Mini Spin Centrifuge	10
4	Weighing Balance	4
5	Gel Rocker	3
6	Water Bath	6
7	Tube Rotator	1
8	Bath Sonicator	1
9	Dry Bath	2
10	pH meter	2
11	UV Transilluminator	4
12	Refrigerators	14
13	Pharma Refrigerators	5
14	Water Purification System	1
15	Hot Air Oven	2
16	Air sampler	1

4. Synthetic Chemistry Laboratory

Synthetic chemistry laboratory is mainly focused on synthesis of antiviral drugs against existing and newly emerging viruses. The laboratory is equipped to carry out multistep organic synthesis. The facilities include a 4 feet chemical fume hood for the handling of hazardous substances, stirrer hot plates, rotary evaporator, high vacuum pump, flammable chemical storage refrigerator, flammable chemical storage cabinet, Schlenk lines, heating mantles, microwave for chemical synthesis, analytical balance, UV lamp and viewing cabinet.

a. Scientist in charge: Dr. E. Sreekumar

b. Designation: Director, IAV

Team Member

Sl No.	Name	Designation	Qualification
1	Dr. Nanditha Nair G	Principal Project Associate	PhD

Courses/Trainings attended by Faculty/ Staff/ Students:

1. NIE-ICMR e-Certificate course- Ethics Review of Health Research

Sl No.	Name of Staff	Designation
1	Dr. Binod Kumar	Scientist EII
2	Mr. Vinod S	Technical Officer-Technical Support
3	Ms. Shilpa Ravindran	Technical Assistant
4	Dr. Lekshmi V. S	Project Scientist I
5	Ms. Abhila Asi	Project Associate
6	Ms. Arya U.M	Project Assistant

2. ISO 15189:2022 Internal Auditor Training

Sl No.	Name of Staff	Designation
1	Mr. Nithin Besent N	Technical Officer-Engineering Support
2	Mr. Vinod S	Technical Officer-Technical Support
3	Ms. Sreeja S	Technical Officer- Molecular Diagnostic Support
4	Ms. Shilpa Ravindran	Technical Assistant
5	Mr. Arun V Jose	Technical Assistant
6	Ms. Chippy P. S	Project Associate
7	Ms. Megha Chandran	Project Associate
8	Ms. Rakhi S	Laboratory Technician
9	Ms. Archana T. S	Laboratory Technician
10	Ms. Arya U.M	Project Assistant

List of Publications

- Ravindran Shilpa, Anismrita Lahon Tropism and immune response of chikungunya and zika viruses: an overview. Cytokines (Under review)

- Becatti M, Dmello C, Kumar B, Editorial: Exploring circular RNAs and their applications within health and disease. Front. Mol. Biosciences. doi: 10.3389/fmolb.2023.1145738

- Asha K, Meseko CA, Kumar B, Editorial: Influenza and Related Viruses: Epidemiology, Pathogenesis and Therapeutics. Front. Mol. Biosciences. doi.org/10.3389/fmolb.2022.1117067

- Lekshmi VS, Asi A, Arya UM, Kumar B, Cellular signaling and virus-host interactions:Anupdate on the potential therapeutic management of SARS-CoV-2 infection.Frontiers in Molecular Biosciences 2023.

- Meseko CA, Sanicas M, Sulaiman L, Asha K, Kumar B, Antiviral options and therapeutics against influenza: History, latest developments and future prospects. (Under review)

- Meseko CA, Ameji NO, Kumar B Rational Approach to Vaccination Against Highly Pathogenic Avian Influenza in Nigeria: A Scientific Perspective and global best practice. (Under review)

- Vanshika Singh, Sonal Garg, Nisha Raj, Asha Lukose, Deepti Jamwal, Reshma Perween, Samridhi Dhyani, Hilal Ahamed Parray, Chandresh Sharma, Rajesh Kumar* Protocol for High Throughput Screening of Antibody Phage Libraries, Bio-Protocol 2022, Vol 12, Iss 12, June 20, DOI: 10.21769/BioProtoc.4450

- Sonal Garg, Nisha Raj, Asha Lukose, Deepti Jamwal, Hilal Ahmed Parray, Sandeep Anand, Samridhi Dhyani, Kamini Jakhar, Sudipta Sonar, Mahima Tiwari, Reema, Shailendra Mani, Sankar Bhattacharyya, Chandresh Sharma, Tripti Shrivastava, Rajesh Kumar, Characterization of a broadly cross-reactive tetravalent human monoclonal antibody, recognizing conformational epitopes in receptor binding domain of SARS-CoV-2. 3 Biotech, August 2022, doi.org/10.1007/s13205-022-03272-6

- Gayathri Krishna, Vinod Soman Pillai, Poornima Gopi, Mohanan Valiya Veettil, Epstein-Barr virus infection controls the intracellular antioxidant glutathione by upregulating the expression of glutamate transporter EAAT3. 59(1):55-66. Virus Genes. 2023

- Poornima Gopi, T R Anju, Vinod Soman Pillai, Mohanan Valiya Veettil, SARS-Coronavirus 2, A Metabolic Reprogrammer: A Review in the Context of the Possible Therapeutic Strategies. Current drug targets.23 (8):770-781. 2022.

- Arathi Rajan, Anuja S Nair, Vinod Soman Pillai, Mohanan Valiya Veettil, Nipah virus: A threat to public health. Advances in life sciences. 1 (2), 2022

- Poornima Gopi, Gayathri Krishna, Mohanan ValiyaVeettil, Biology of Variola Virus (Under review)

- Sagna A, Nair R V R, Hulyalkar N, Rajasekharan S, Nair VTG, Sivakumar KC, Suja SR, Baby S, Sreekumar E, Ethyl palmitate, an anti-chikungunya virus principle from Sauropusandrogynus, a medicinal plant used to alleviate fever in ethnomedicine J Ethnopharmacol. 2023 Jun 12; 309:116366. doi: 10.1016/j.jep.2023.116366.

- Nair SR, Abraham R, Sreekumar E, Generation of a Live-Attenuated Strain of Chikungunya Virus from an Indian Isolate for Vaccine Development. Vaccines (Basel). 2022 Nov 16;10(11):1939. doi: 10.3390/vaccines10111939.

- Chandran D, Sreekumar E, Prajitha KC, Sharahudeen A, Raveendran CL; Research team, Breakthrough infection with SARS-CoV-2 delta variant in old-age homes in a Southern District of Kerala, India. Indian J Public Health. 2022Nov;66(Supplement): S36-S40. doi: 10.4103/ijph.ijph_1084_22. PMID: 36412471.

Annual Financial Report 2022- 23

Institute of Advanced Virology
Thiruvananthapuram

Administrative Team

INSTITUTE OF ADVANCED VIROLOGY

(An autonomous institution under Sciemce and Technology Department, Government of Kerala)

Bio 360 Life Sceinces Park, Thonnakkal, Thiruvananthapuram, Kerala - 695317

Balance Sheet for the year ended 31st March, 2023

Liabilities	Note		Amount(₹)	Assets	Note		Amount(₹)
Capital Account				**Fixed Assets**	7		10,31,99,302.00
Excess of Expenditure over Income			-15,80,707.79	- Opening Balance:		-	
- Deficit FY 21-22		-16,01,905.79		- Add Acquired during the FY 22-23		16,74,20,675.00	
- Surplus FY 22-23		21,198.00		- Less Adjusted against Grant in Aid		16,74,20,675.00	
Grant from Government of Kerala			10,13,50,262.00			-	
GOVT.GRANT (PLAN FUND) Closing Balance	1	10,00,000.00		Capital Work In progress: Building		10,31,99,302.00	
Grant set apart to SBI Pool A/c for GEM		5,24,03,910.00					
Grant Utilised 21-22 for Building WIP		4,79,46,352.00					
Current Liabilities			7,03,54,451.00	**Current Assets**			6,69,24,703.21
Duties & Taxes	2	5,42,917.00		Fixed Deposit in Canara Bank, Pattom	8	63,26,153.00	
Sundry Creditors	3	5,69,85,436.00		Loans & Advances (Asset)	9	1,00,000.00	
Salary & Allowances Payable - March 23		12,32,647.00		TDS Refundable		19,000.00	
Security Deposit & EMD Received	4	13,11,514.00		Security Deposit	10	15,000.00	
Retention Money and Other Deductions	5	73,10,487.00		Cash-in-Hand		-	
External Fund for Projects	6	35,69,519.00		Bank Accounts	11	6,04,64,550.21	
Other Current Liability		3,01,931.00					
(Difference in opening Balance 21-22)							
Total			17,01,24,005.21	Total			17,01,24,005.21

INSTITUTE OF ADVANCED VIROLOGY

(An autonomous institution under Sciemce and Technology Department, Government of Kerala)

Bio 360 Life Sceinces Park, Thonnakkal, Thiruvananthapuram, Kerala - 695317

Income & Expenditure Account for the year ended 31st March, 2023

Expenditure	Amount(₹)	Income	Amount(₹)
To Laboratory Consumables	2,99,99,752.00	***By Grant in Aid Utilised for Revenue Expenses***	6,69,82,337.00
To Salary & Allowances - Scientist	69,79,281.00	*By Internship programme fee*	4,10,000.00
To Salary & Allowances - Director	33,42,943.00	*By Income from External Fund based Projects - Overhead Charge*	1,14,900.00
To Salary & Allowances - Admin Staff	20,90,407.00	*By Interest Income*	2,12,281.00
To Salary & Allowances - Technical Staff(Regular)	28,96,137.00	*By Miscellaneous Income*	23,575.00
To Salary & Allowances - Flagship Prgm, Contract Staff etc.	75,70,067.00		
To Salary & Alowances - Daily Wages Staff	6,97,689.00		
To Security Service Charges	13,02,689.00		
To Group Gratuity Scheme premium	5,57,081.00		
To Meeting/ Seminar/ Conference related expense	4,22,526.00		
To Affiliation & Other Registration Expenses	4,27,035.00		
To Electricity Charge	37,53,229.00		
To Water Charges	1,68,208.00		
To Telephone & Internet Charges	1,39,953.00		
To Repairs & Maintenance - Diesel Generator	24,25,015.00		
To Repairs & Maintenance - Building & Campus	4,16,987.00		
To Repairs & maintenance - Electrical & plumbing	1,60,448.00		
To Repairs & maintenance - Office Assets/ Equipments	3,43,500.00		
To Repairs & maintenance - Others	19774.00		
To Advertisment & Promotion Charges	7,44,557.00		
To Vehicle Hire Charge	14,51,140.00		
To Office Expenses/ Miscellaneous Expenses	3,99,998.00		
To Internal Audit Fee	59,000.00		
To MAB Workshope Expenses (**Note - 12**)	3,62,580.00		
To Postage & Courier Charges	7,192.00		
To Printing & Stationery	3,22,544.00		
To Professional/ Consultancy Charges	1,95,210.00		
To Website Expenses, IT Network Expenses etc.	2,53,962.00		
To Refreshment and Other Related Expenditure	2,12,989.00		
To Surplus *(Excess of Income over Expenditure)*	21,198.00		
Total	6,77,43,093.00	**Total**	6,77,43,093.00

INSTITUTE OF ADVANCED VIROLOGY

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Bio 360 Life Sceinces Park, Thonnakkal, Thiruvananthapuram, Kerala - 695317

Notes to Financials 2022-23

Note - 1

GOVT.GRANT (PLAN FUND)	Amount (₹)
Opening Balance	10,00,000.00
Add:	
- Received During the year	*30,43,00,000.00*
Less:	
- Utilised against capital expenditure During the year	*16,74,20,675.00*
- Utilised against revenue expenditure During the year	*6,69,82,337.00*
Balance	*7,08,96,988.00*
Less:	
- Fund set apart to SBI Pool A/c for GEM Purchase purpose	*5,24,03,910.00*
- Amount resumed by Government of Kerala	*1,74,93,078.00*
Balance as on 31-03-23	**10,00,000.00**

Note - 2

	Duties & Taxes	Amount (₹)
1	*TDS - Advertisement*	*2,098.00*
2	*TDS - Security Service*	*136.00*
3	TDS on CGST	21,632.00
4	TDS on SGST	21,632.00
5	TDS on IGST	4,97,419.00
	Balance as on 31-03-23	**5,42,917.00**

Note - 3

	Sundry Creditors	Amount (₹)
1	Creditors for expenses	8,32,486.00
2	*Kerala Life Science Park (P) Ltd.*	5,52,52,950.00
	Balance as on 31-03-23	**5,60,85,436.00**

Note - 4

	Security Deposit, EMD Received etc.	Amount (₹)
1	Security Deposit	2,55,125.00
2	EMD Received	10,56,389.00
	Balance as on 31-03-23	**13,11,514.00**

Note - 5

	Retention Money and Other Deductions	Amount (₹)
1	Deduction Instead of Bank Guarantee	38,47,013.00
2	Retention Money: Uralungal (ULCCS)	34,63,474.00
	Balance as on 31-03-23	**73,10,487.00**

Note - 6

	External Fund for Projects	Amount (₹)
1	DST Inspire Faculty Award - Dr. Anismrita Lahon	8,07,087.00
2	DST SERB Project - Dr. Rajesh Kumar	14,05,105.00
3	ICMR Project - Dr. Sreekumar	8,64,203.00
4	DBT Ramalingaswami Fellowship - Dr.Mohanan VV	4,93,071.00
5	DST SERB Project Dr.Mohanan VV	53.00
	Balance as on 31-03-23	**35,69,519.00**

Note - 7

Fixed Assets

Sl. No:	Particulars	Opening Balance	Recognised during previous year	Recognised during FY 22-23	Adjusted against grant during previous years	Adjusted against grant during FY 22-23	Balance(₹)
			A	B	C	D	E=A+B-C-D
1	**Building & Infrastructure**						
	Phase 1A - Building & Infrastructure	-	89,07,922.00	50,86,597.00	89,07,922.00	50,86,597.00	-
	Phase 1B - Lab Infrastructure	-	-	44,84,016.00	-	44,84,016.00	-
2	**Computer & Accessories**						
	Computer & Accessories	-	5,08,800.00	14,60,907.00	5,08,800.00	14,60,907.00	-
	LCD Projector BENQ EW 600	-	54,900.00	-	54,900.00	-	-
	Printer and Accessories	-	94,900.00	2,47,802.00	94,900.00	2,47,802.00	-
3	**Electric & Electronic Items**						
	Electric & Electronic Items	-	28,387.00	-	28,387.00	-	-
	Audiovisual Equipment	-	-	2,95,209.00	-	2,95,209.00	-
4	**Furniture & Fixtures**						
	Furniture & Fixtures	-	2,49,249.00	83,79,245.00	2,49,249.00	83,79,245.00	-
	Laboratory Furnishing (Benches)	-	53,80,624.00	-	53,80,624.00	-	-
5	***Lab Assets***						
	Lab Equipments	-	2,58,68,317.40	8,89,21,137.00	2,58,68,317.40	8,89,21,137.00	-
	Lab - Molecular Diagnostic Facility	-	-	28,31,366.00	-	28,31,366.00	-
6	***Other Fixed Assets***						
	Garden Equipment	-	3,575.00	-	3,575.00	-	-
	Other Fixed Assets	-	-	70,266.00	-	70,266.00	-
7	**Intangible Assets**						
	Computer Software	-	68,000.00	7,62,100.00	68,000.00	7,62,100.00	-
	Software License	-	-	1,34,980.00	-	1,34,980.00	-
8	**Leasehold Land - Phase 1B**						
	Land - Phase 1B	-	-	5,47,47,050.00	-	5,47,47,050.00	-
	Total	-	4,11,64,674.40	16,74,20,675.00	4,11,64,674.40	16,74,20,675.00	-
	Captal Work-in-Progress						
	WIP Building - Phase 1B	-	-	10,31,99,302.00	-	-	10,31,99,302.00
	Total	-	-	10,31,99,302.00	-	-	10,31,99,302.00

Note - 8

	Fixed Deposit in Canara Bank, Pattom	Amount (₹)
1	130011447299/2	30,94,300.00
2	130018615856/1	30,21,452.00
3	140046284620/1	2,10,401.00
Balance as on 31-03-23		**63,26,153.00**

Note - 9

Loans & Advances (Asset)	Amount (₹)
Adv. for Establishment of Green Ambience - Phase 1A	1,00,000.00
Balance as on 31-03-23	**1,00,000.00**

Note - 10

Security Deposit	Amount (₹)
SD to Supplyco for Diesel Supply	*15,000.00*
Balance as on 31-03-23	**15,000.00**

Note - 11 **Bank Accounts**

Sl.No:	Particulars	Branch	A/c No:	Purpose	Closing Balance(₹)
1	Treasury Account	Kazhakootam	799012700002191	Operating	10,00,000.00
	Major Bank Accounts				
2	Canara Bank	Pallipuram	5513101003216	Operating	5,90,227.21
3	Canara Bank	Pattom II	110035502363	Operating	24,89,447.00
4	Canara Bank	Pattom II	110063988092	Easy Fee A/c IAV	4,11,446.00
5	SBI	Chempakamangalam	41442694591	GEM Pool A/c	5,24,03,910.00
	Bank Accounts - Projects				
6	Canara Bank	Pattom II	110034144129	Dr.Anismrita DST IFA	4,32,187.00
7	Canara Bank	Pattom II	110034143946	Dr.Rajesh DST SERB	14,05,105.00
8	Canara Bank ICMR	Pattom II	110108094141	Director, IAV	8,64,203.00
9	Canara Bank	Pattom II	110034552770	Dr.Mohanan RSF	4,93,071.00
10	Canara Bank	Pattom II	110034140630	Dr.Mohanan DBT SERB	53.00
11	Bank of Maharashtra	Kazhakootam	60429713394	Dr.Anismrita PFMS A/c	3,74,900.00
	Bank Accounts - Other				
12	Canara Bank	Pattom II	110064019189	Seminar/ Workshop A/c	1.00
13	SBI	Chempakamangalam	41430501536	E Tendering A/c	-
	Total				**6,04,64,550.21**

Bank reconciliation

Canara Bank	Branch : Pattom II	A/c No. 110035502363
Balance as per Bank Statement		**25,06,467.00**
Less Cheque paid but not submitted	19,500.00	
- Paid to M/s Unique Scientific on 29-03-23		
Add Cheque deposited but not credited	2,480.00	
- Cheque of M/s Ventech Science Products		
Balance as per Accounts		**24,89,447.00**

Note - 12

	MAB Workshope Income & Expenses	
A	**Income:**	
	SPONSORSHIP/ EXHIBITION AREA CHARGES	*4,35,000.00*
	SPONSORSHIP FUND-ICMR FUND	*6,50,000.00*
	SPONSORSHIP FUND-OTHERS	*3,50,000.00*
	INTEREST ON SB ACCOUNT	*6,003.00*
	REGISTRATION FEE/FOOD/ACCOMODATION CHARGES	*2,35,200.00*
	Total	***16,76,203.00***
B	***Expenses:***	
	ACCOMODATION CHARGES	*1,21,897.00*
	BANK CHARGES	*66.00*
	EVENT MANAGEMENT CHARGES	*4,33,060.00*
	FOOD & CATERING EXPENSES	*2,98,148.00*
	HOUSE KEEPING CHARGES	*87,910.00*
	LAB CONSUMABLES/OTHERS	*4,09,433.00*
	OTHER EXPENSES	*1,75,548.00*
	PRINTING CHARGES	*82,093.00*
	PRIZE MONEY /AWARDS/OTHERS	*1,12,541.00*
	REFRESHMENT CHARGES	*6,800.00*
	TA/HONORARIUM	*1,20,356.00*
	TRAVEL EXPENSES	*1,14,602.00*
	VEHICLE HIRING CHARGES	*76,329.00*
	Total	***20,38,783.00***
C	***Excess of Expenditure (B-A):***	***3,62,580.00***

V. PERFORMANCE ANALYSIS

The review of operations of the Institute for the financial year 2022-23 in monetary terms is given below.

1. Total grant received from the Government of Kerala by the institute during the FY 22-23 is ₹30.43 crores.
2. The grant utilized by the institute for the capital expenditure during the FY 22-23 is ₹16.74 crores and the grant utilized for revenue expenditure during the said financial year is ₹6.70 crores.
3. The Institute set apart an amount of ₹5.24 crores from Grant-in-Aid to SBI Pool A/c for GEM Purchase purpose during the FY 22-23.
4. The institute earned a surplus of ₹21,198 over its expenditure accrued during the FY 22-23.
5. An amount of ₹1.75 crore resumed by the government of Kerala from the treasury account of the institute on 31-03-22, which caused the treasury balance of the institute to become ₹10 lakhs as on 31-03-23 .


KSIDC
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KSIDC

Institute of Advanced Virology

Bio 360 Life Sciences Park, Thonnakkal P.O,
Thiruvananthapuram - 695317

Institute of Advanced Virology Institute of Advanced Virology

Location

Core Facility Services

Molecular Diagnostic Services