सत्यमेव जयते

Department of Biotechnology
Government of India

DBT FIGHTS COVID

VIRUS TO VACCINE


birac
Ignite Innovate Incubate
INSTITUTE OF BIORESOURCES & SUSTAINABLE DEVELOPMENT
United Nations Educational, Scientific and Cultural Organization
RCB
NCCS
inStem
NIPGR
NIAB
NABI
CENTER OF INNOVATIVE AND APPLIED BIOPROCESSING
INDIA
Institute of Life Sciences Bhubaneswar
ICGEB
RGCB
DISCOVERIES FOR A BETTER TOMORROW
NIBMG
thsti
National Brain Research Centre
NBRC
CDFD
National Institute of Immunology
BIBCOL

“The fight against the coronavirus pandemic is an example of India’s self-reliance. India’s strive to achieve self-reliance cannot be possible without the appropriate use of science and technology for economic development and societal benefit.”

Dr Harsh Vardhan
Union Minister of Science & Technology

“When WHO declared COVID-19 a pandemic in January, it was clear to DBT that as a science agency, which is deeply engaged in the biotechnology sector, we have to come forward with all stakeholders to device a collective strategy with the Government of India on how is science and technology going to respond to this huge challenge. The fight against pandemic is being fought by the scientists and the health workers.”

Dr Renu Swarup
Secretary DBT

72nd Republic Day Parade Tableau

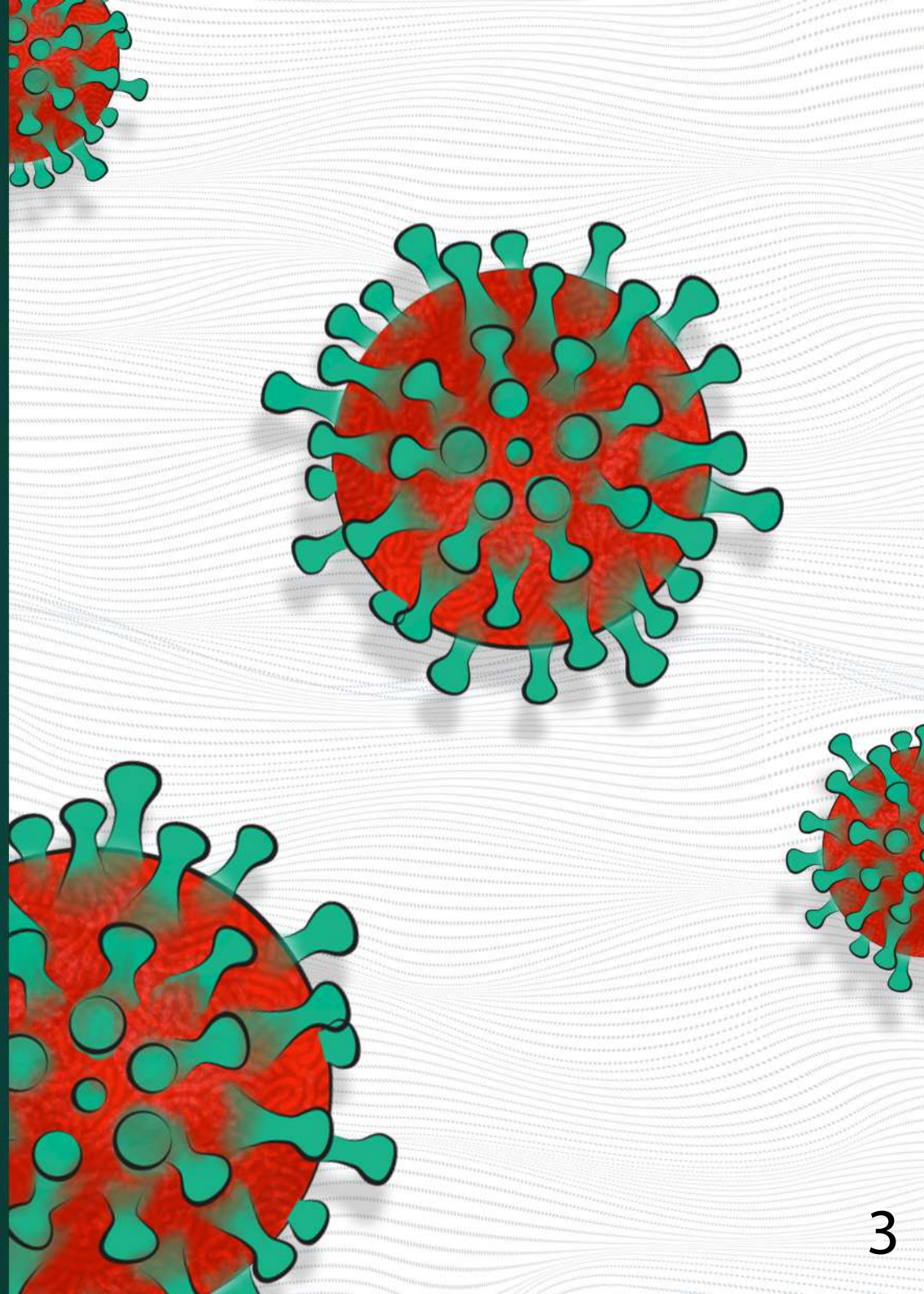
DBT's tableau showcased the strength and efforts of biotechnology sector in responding rapidly through the development of vaccine and diagnostics for COVID-19.

"भारत को कोरोना-मुक्त बनाएंगे
आविष्कार हम करते हैं
चुनौतियों से लड़ते हैं
देश की हैं आन हम देश की हैं शान"

COVID-19

The Virus

Testing, Treatment, Prevention



COVID-19
RESEARCH CONSORTIUM

Develop biomedical tools for prevention, identification and treatment to combat the epidemic of COVID-19 through considering a holistic approach addressing critical roadblocks

Vaccines

Therapeutics

Diagnostics

Other Interventions

TESTING

- Development of molecular and serological tests
- Development of novel diagnostics
- Testing Hubs
- Mobile I-Lab

TREATMENT

- Plasma therapy
- Monoclonal antibodies
- Drug re-purposing efforts
- DBT-AYUSH Phyto-pharmaceuticals

GENOMICS

- PAN-India 1000 SARS-CoV-2 RNA genome sequencing successfully completed by DBT AI consortium
- Nasal microbiome study - Useful for epidemiological studies

PREVENTION

- BCG Trial
- Multiple vaccine platforms
- Assays and animal models
- Clinical Trial sites
- Immunoassay lab

FACILITATING THE ECOSYSTEM

- 5 COVID -19 Bio-repositories
- Indigenization of Resources
- Validation Centres
- Rapid Regulatory Framework

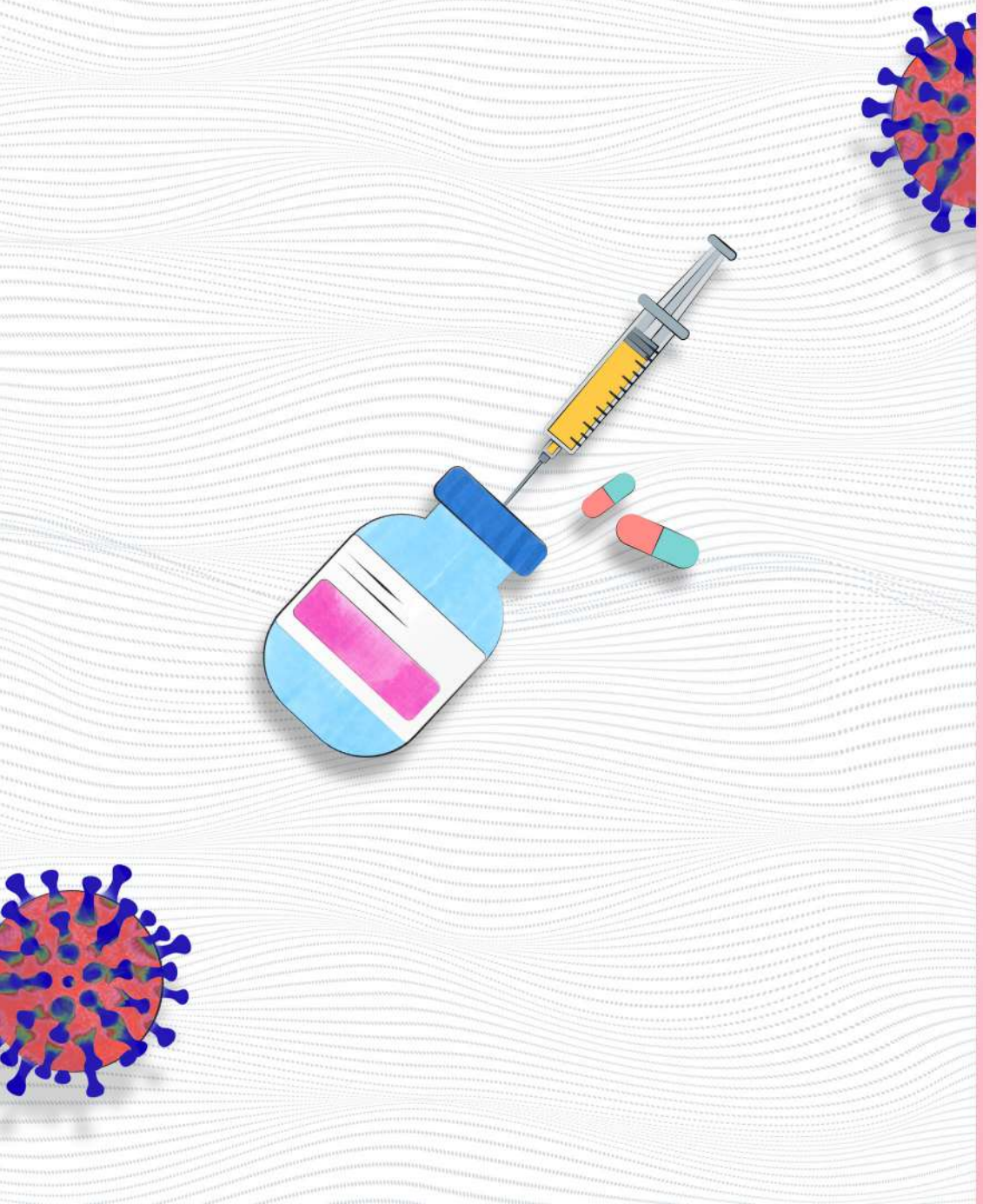
OTHER INTERVENTIONS

- Scaling up of manufacturing- ventilators, PPE, Screening and monitoring devices, disinfection and sterilization platforms

SUPPORT UNDER COVID-19

RESEARCH CONSORTIUM

	Industry/ Industry-Academia Collaborations	Scientists in Academia/ Research institutes
DIAGNOSTICS AND FACILITIES FOR SCALE-UP	31	17
THERAPEUTICS, REPURPOSING & SUPPORTING ECOSYSTEM	11	14
VACCINES & SUPPORTING ECOSYSTEM	14	5
OTHER BIOMEDICAL INTERVENTIONS	20	5
TOTAL	76	41



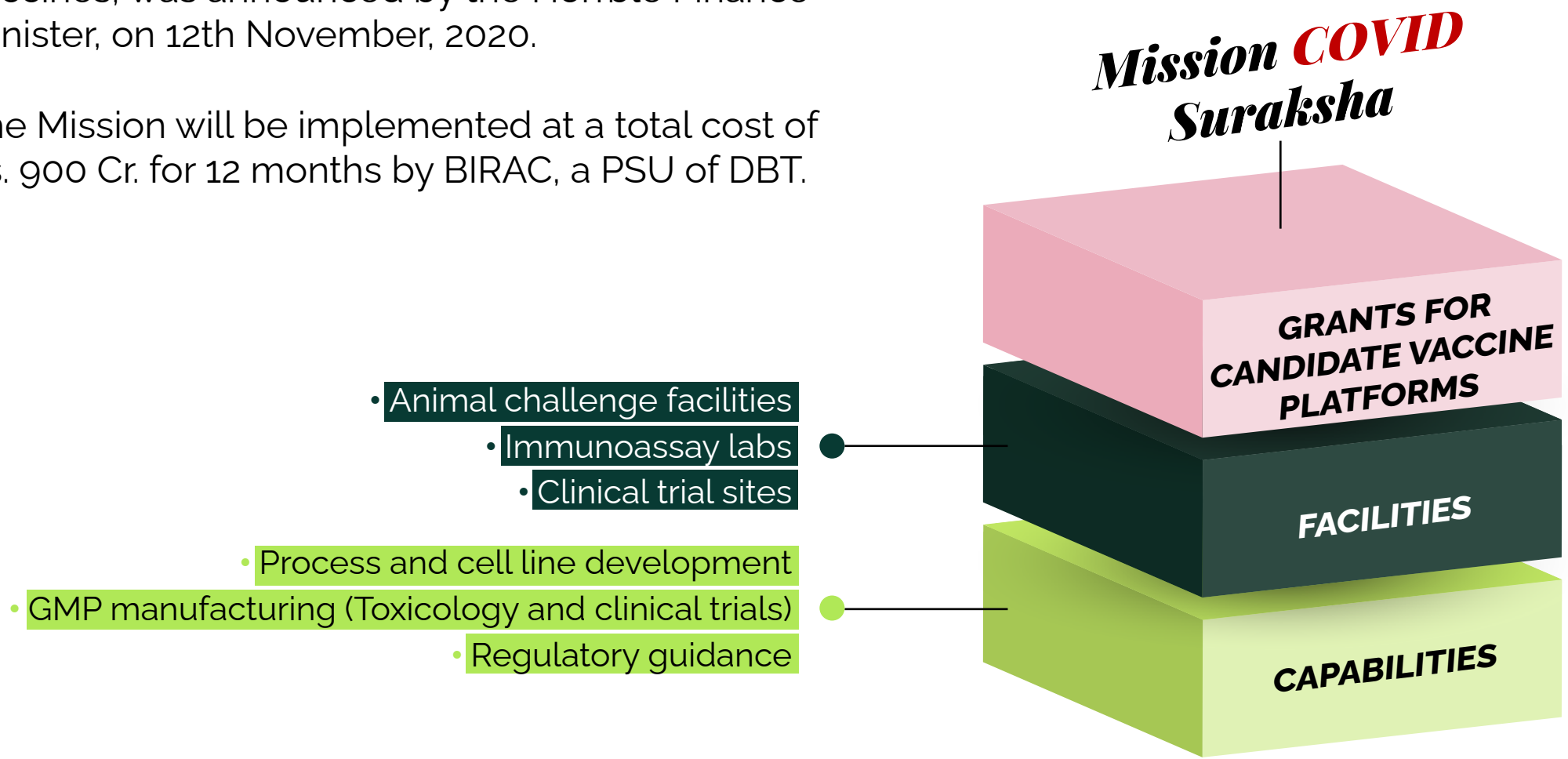
COVID-19

Vaccine Development Status

MISSION COVID SURAKSHA

THE INDIAN COVID 19 VACCINE DEVELOPMENT MISSION

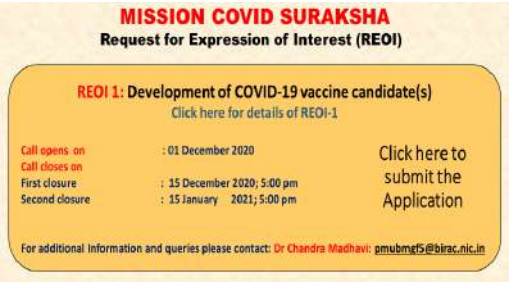
- Mission COVID Suraksha - for research and development of Indian COVID-19 vaccines, was announced by the Hon'ble Finance Minister, on 12th November, 2020.
- The Mission will be implemented at a total cost of Rs. 900 Cr. for 12 months by BIRAC, a PSU of DBT.



MISSION COVID SURAKSHA

THE INDIAN COVID 19 VACCINE DEVELOPMENT MISSION

3 Requests for Expression of Interest (REOI) announced for accelerating Indian COVID-19 vaccine development

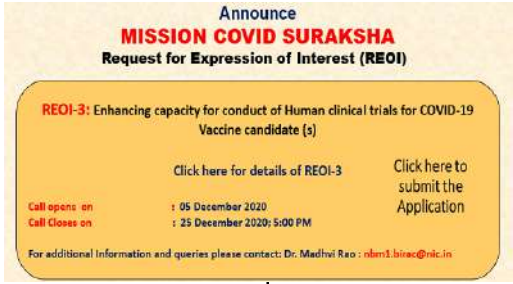


REOI- 1

Accelerated development of 5-6 vaccine candidates that are closer to licensure and introduction in the market within the next 12 months.

Strengthening service facilities for conducting animal studies and immunological assays and make them available for COVID-19 vaccine developers

REOI- 2



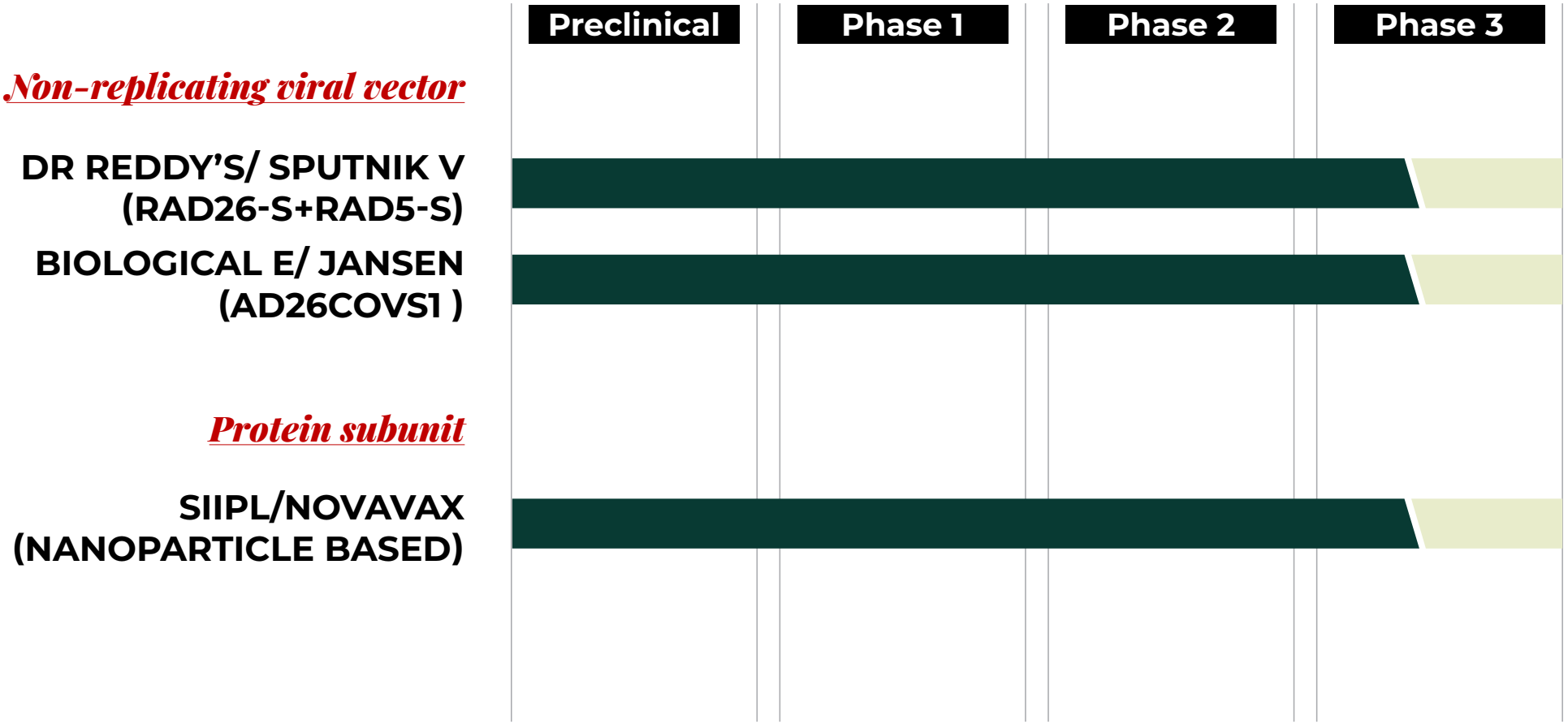
REOI- 3

Strengthening Capacities to conduct Clinical Trials for COVID-19 Vaccine Candidates

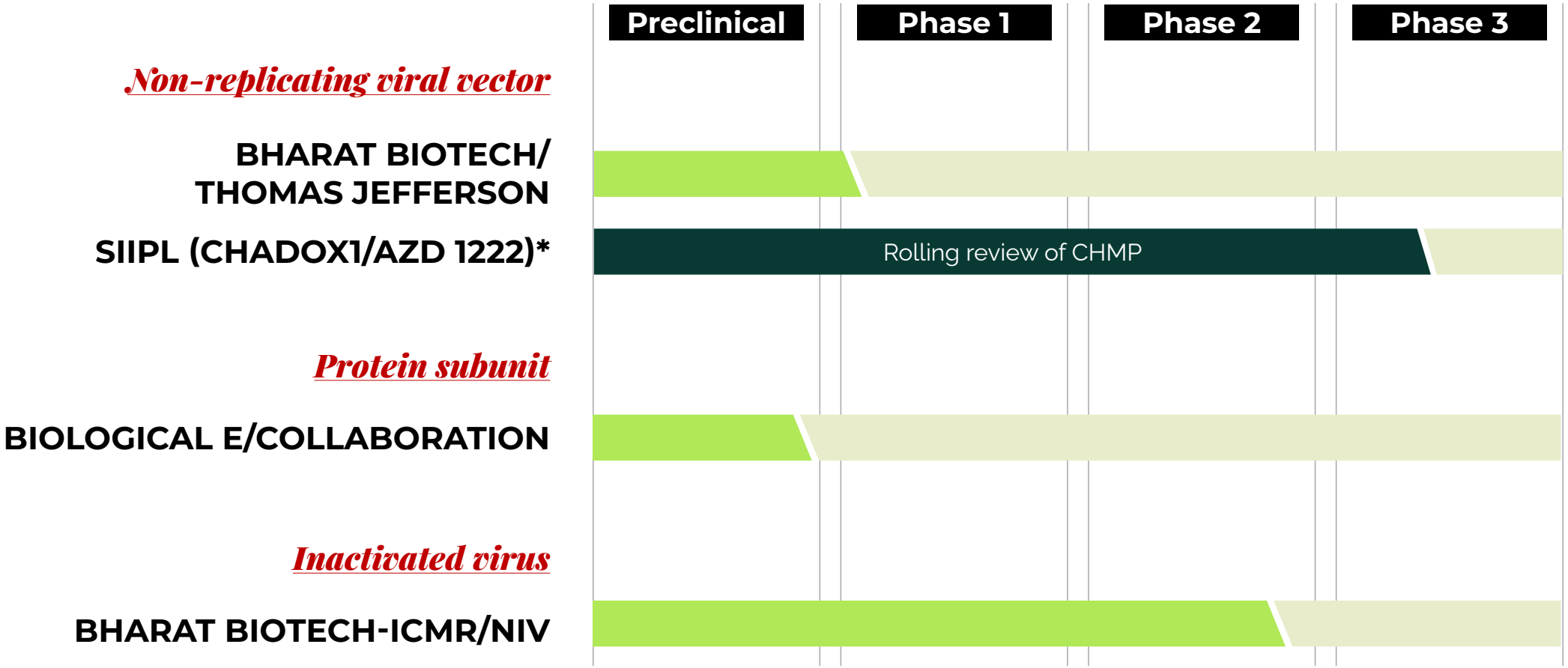
Candidate	Scale-up feasibility	Delivery feasibility	Company Experience	Existing Dose Commitment
SIIPL (ChAdOx1/ AZD 1222)	No non-replicating viral vector vaccine licensed in India	2 doses, IM, 2-8 degree C	WHO PQ, supplying vaccines globally – NRA by ANVISA, INVIMA, SAHPRA, PICS	100 million doses committed to GAVI
Biological E (protein subunit)	Established platform	2 doses, IM, 2-8 degree C	WHO PQ facilities, FDA, EMA approved DP facilities	Min. 21% of annual production to GAVI eligible countries and 49% to India
Bharat Biotech-ICMR/NIV	Need for BSL-3 facilities	2 doses, IM and ID	WHO PQ facilities; Have BSL-3 facilities	MoU with ICMR states priority is to provide vaccines to GoI
Zydus Cadila (DNA)	Time to manufacture a risk as facility under development; regulatory clearance needs clarity	Potential barriers to uptake due to ID admin. and/or need for delivery device	WHO PQ facilities	No
Gennova (Sa mRNA)		2 doses, IM, 2-8 degree C	First vaccine to be commercialised. Strong in biotherapeutics	No

AGREEMENTS SIGNED:

GLOBAL STATUS OF DEVELOPMENT

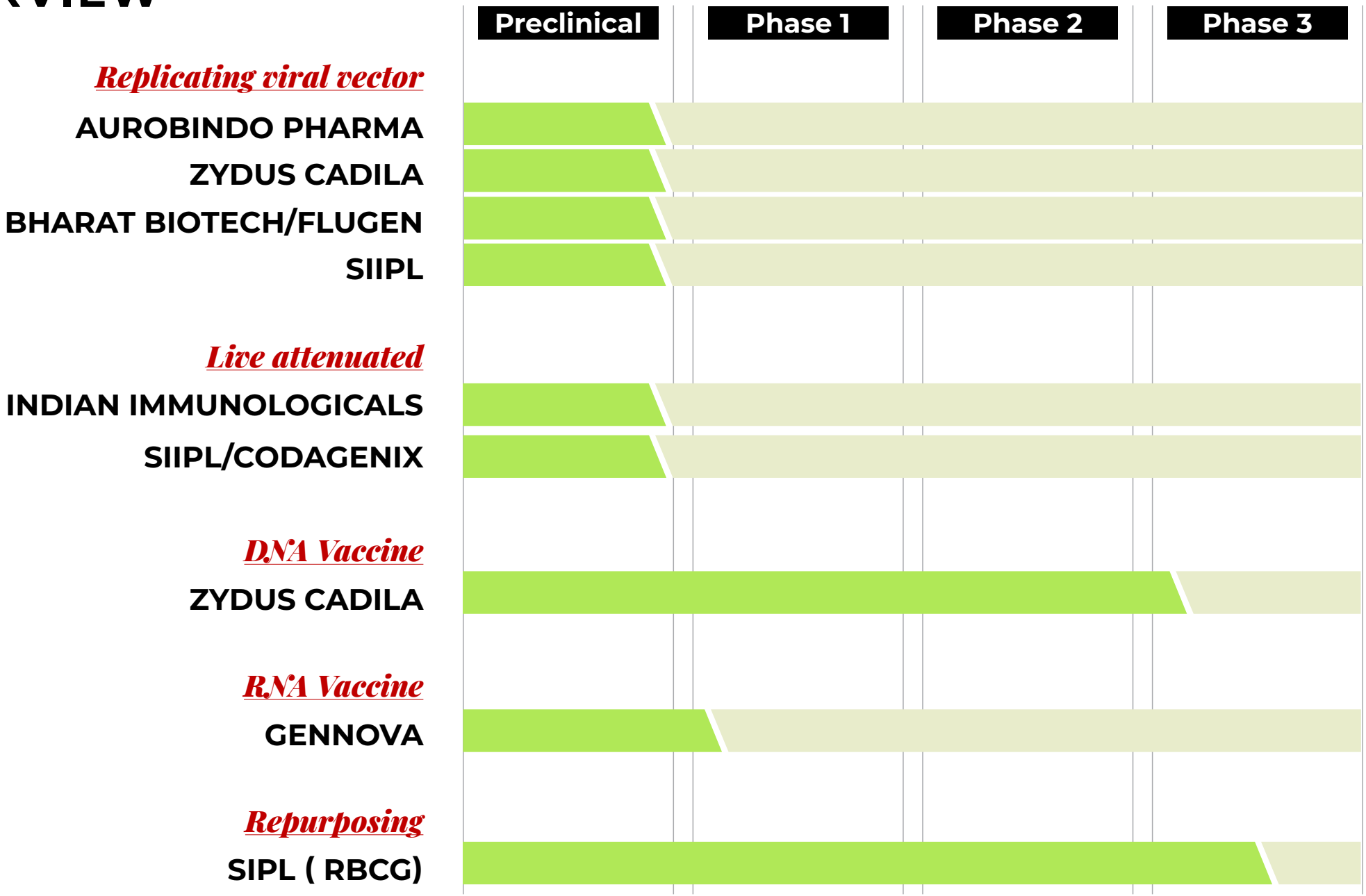


R&D PIPELINE:
OVERVIEW



*Granted permission for restricted use in emergency situation

R&D PIPELINE:
OVERVIEW



PACT -
A SCIENCE DIPLOMACY INITIATIVE

Phase III Clinical Trials of Indian COVID vaccines in Neighbouring and Friendly Countries

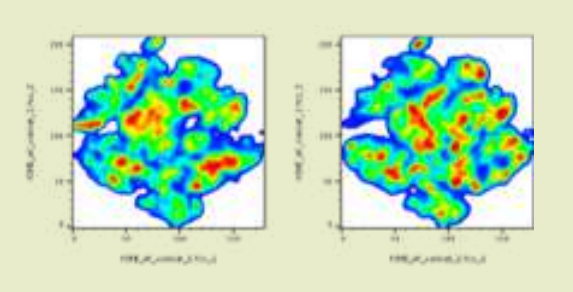
- Advisory support to LMICs for executing Phase III clinical trials
- Immunogenicity assay testing of potential vaccine candidates

Trainings for Strengthening Clinical Research Capacity in Neighboring Countries

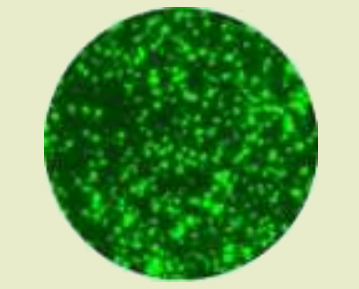
- E-course series of 4 Programs held from October-December
- Well-received by participants from Nepal, Maldives, Bangladesh, Mauritius, Sri Lanka, Bhutan and Afghanistan

DEVELOPMENT OF HUMAN T-CELL ASSAYS AT DBT-NII

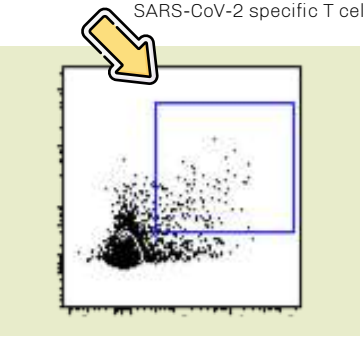
- Cutting-edge T-cell assays for measuring the vaccine efficacy.
- Assays for studying the T-cell correlates-of-protection in COVID-19 and defining the traits of immunological memory.



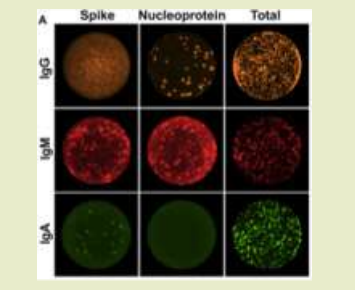
FACS based deep T-cell phenotyping



ELISPOT based T-cell IFN-ɣ secretion Assay



Activation Induced T-cell Assay



Qualitative assessment of T cells

- Indian population has very high levels of T cells developed during exposure to 'Common Cold' viruses, prior to the COVID-19 pandemic. These pre-existing T cells strongly respond to the COVID-19 virus.
  (A.Ansari et.al., 2020. doi.org/10.1101/2020.11.16.20232967)
- Indian patients recovered from mild COVID-19 disease have durable immunological memory in most important protective arms of protective immunity – T cells, B cells and antibodies. Such memory response should give protection against re-infection at least for few years.
  (A.Ansari et.al., 2020. doi.org/10.1101/2020.11.16.20232967)

GLOBAL PARTNERSHIPS

- Partnership with Ministry of External Affairs (MEA) and Indian Missions abroad for strengthening of clinical trial capacity in neighbouring countries.
- THSTI's Bioassay laboratory supported under the Ind-CEPI Mission selected by as one of the 06 global network of laboratories for centralized assessment of COVID- 19 Vaccines.
- DBT as the focal point for the R&D and manufacturing as part of the ACT accelerator

India's engagement in ACT Accelerator

PARTNERSHIPS FOR GLOBAL IMPACT

DIAGNOSTICS AND VALIDATION

FIND
Because diagnosis matters

COVID-19 VACCINE DEVELOPMENT

Biological E. Limited
Celebrating Life Every Day

INDIAN IMMUNOLOGICALS LIMITED

BHARAT BIOTECH

Mynvax

INTAS

Zydus
dedicated to life

ASSAY ESTABLISHMENT AND SUPPORT SYSTEM FOR VACCINE DEVELOPMENT AND SERO-EPIDEMIOLOGY

World Health Organization

CEPI

Duke Human Vaccine Institute
Duke University School of Medicine

VACCINE DEVELOPMENT AND DELIVERY SYSTEMS

MSD · Wellcome Trust
Hilleman Laboratories
Developing vaccines for global health

PHASE III CLINICAL TRIALS OF INDIAN COVID VACCINES IN NEIGHBOURING AND FRIENDLY COUNTRIES

Building science diplomacy for technological advancement and acceleration of indigenous vaccine development efforts

1

For Indian companies and researchers, conducting Clinical trials of vaccines developed by them in neighbouring and friendly countries

2

For LMICs, access to advisory support for planning and executing Phase III trials

3

For partnering countries, access to the Indian Vaccine development Ecosystem e.g. immunogenicity assay testing of potential vaccine candidates

TRAININGS FOR STRENGTHENING CLINICAL RESEARCH CAPACITY

IN NEIGHBOURING COUNTRIES

SCOPE

- Strengthen clinical trial capabilities of researchers in neighboring countries for conduct of trials is in compliance with ICH-GCP guidelines
- Trainings on GCP, ethics, GCLP and large vaccine trials

LEAD BY

- BIRAC +CDSA, THSTI
- Sessions delivered by field experts

TRAINEES

- PI, Co-PIs, health workers, technicians, nurses and support staff from hospitals, CHCs, field sites
- 1st series has ~90 participants from Nepal, Maldives, Bangladesh, Mauritius, Sri Lanka, Bhutan and Afghanistan

DELIVERY MODE

- Each series has 3-4 modules organized weekly
- Online mode with exit exam and certifications

TRAINING PROGRAM TO STRENGTHEN THE CLINICAL TRIAL RESEARCH CAPACITY IN NEIGHBORING COUNTRIES

Series initiated on 22nd September; Successfully completed 4 E-Courses Organised by DBT India and BIRAC, through their Ind-CEPI Mission along with MEA and Missions abroad

2nd series commenced on 21st January 2021

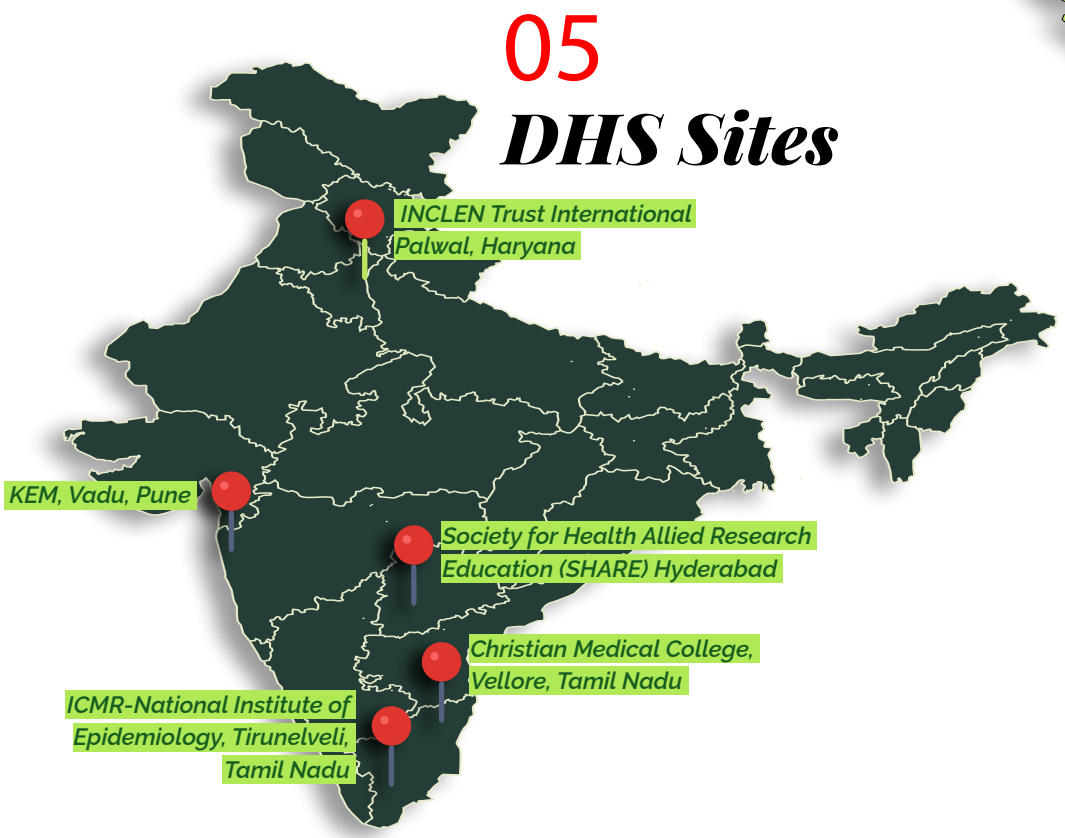
- **Good Clinical Practice: 4 Session E-Course**
- **Ethical Considerations in Clinical Research: 2 Session E-Course**
- **Good Clinical Laboratory Practice: 2 Session E-Course**
- **Large Vaccine Field Trials: 2 Session E-Course**

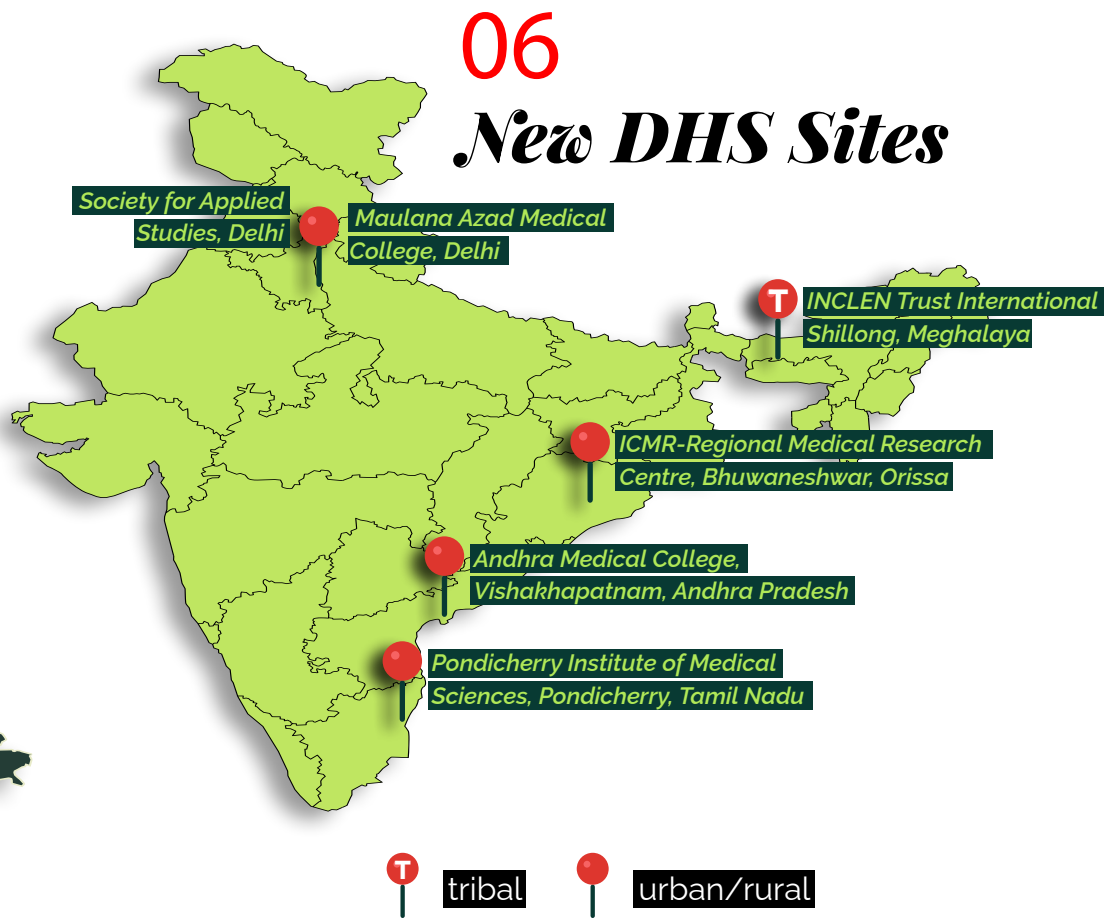
Glimpses from GCP Series

Glimpses from Ethical Considerations in Clinical Research Series

FIELD SITES FOR
CLINICAL TRIALS

DBT's Resource of Indian Vaccine Epidemiology Network (DRIVEN)





CLINICAL IMMUNOGENICITY

GLOBAL STATUS OF DEVELOPMENT

Aim is to address the need of Indian Vaccine companies for Immunogenicity assays

Two Immunogenicity GCLP compliant labs established (Total IgG, Neutralisation, CMI)

- **THSTI, Faridabad,** *as one of the CEPI global network labs*
- ***IRSHA, Pune***

Plan to establish 4 more labs under Ind-CEPI for supporting vaccine trials

- ***Antibody response***
- ***CMI response***

COVID-19 CONSORTIUM DIAGNOSTICS

PROJECT PORTFOLIO

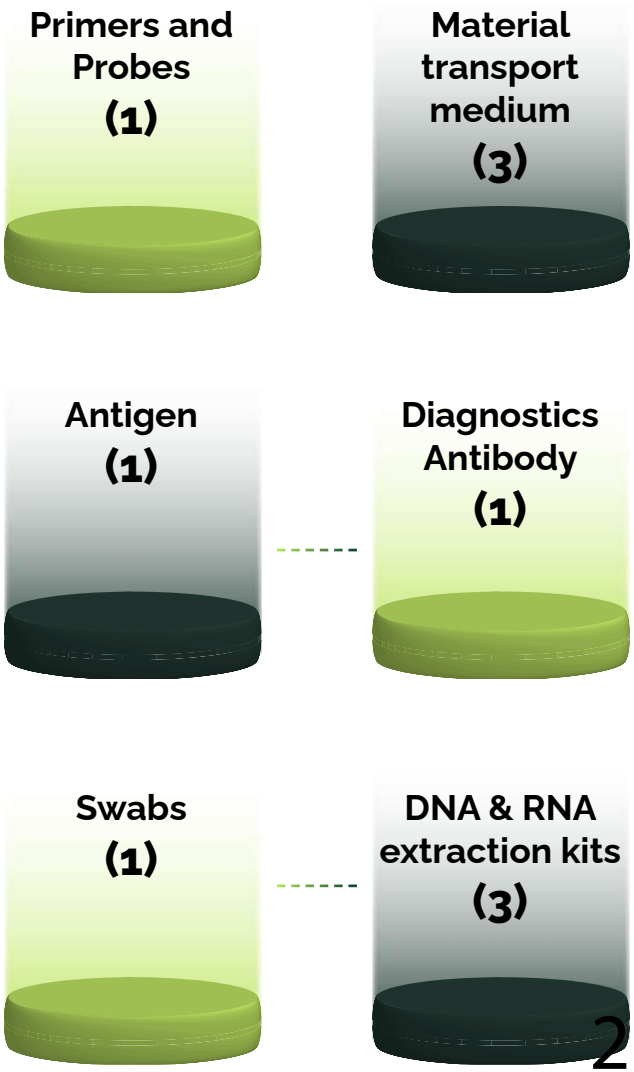
COMMON/SHARED FACILITIES - DBT AMTZ COMMAND CONSORTIA

- Ventilator assembly line **(3500 units manufactured)**
- RT-PCR assembly line **(94 lakh test manufactured)**
- VTM **(6 lakhs units)**

PORTFOLIO OF VARIED DIAGNOSTIC FORMATS

- 10 Nucleic Acid Detection
- 10 Antibody Detection Test
- 04 Antigen Detection Test
- 01 AI based Detection System

COMPONENTS/ REAGENTS (TOTAL 5)

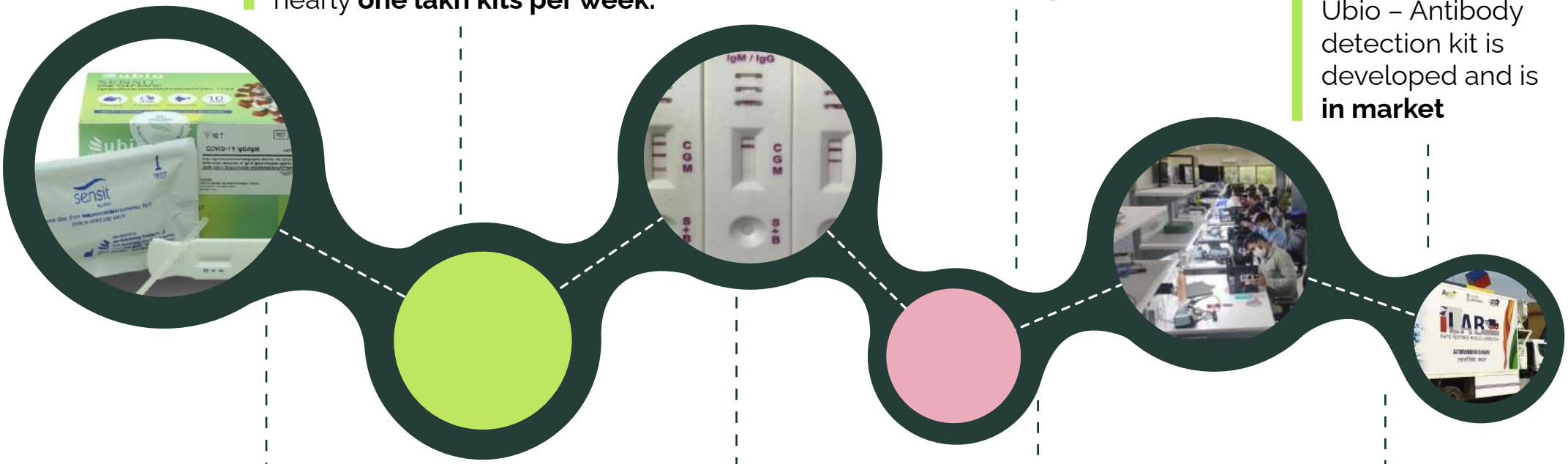


ACHIEVEMENTS

First Indigenous kit for diagnosis of COVID-19 developed by a BIRAC supported start up (MyLab) in Pune, is producing nearly **one lakh kits per week.**

The first I-Lab is operational and is attached to the THSTI, Faridabad hub. It visited in and around villages and colonies of Faridabad, Ballabhgarh, and Palwal and **has tested 13,000+ samples in total.**

Ubio – Antibody detection kit is developed and is **in market**



Andhra Pradesh MedTech Zone (AMTZ): Shared facility to manufacture diagnostic kits, ventilators and imaging equipment. Manufacturing capacity of **3 lakh RT-PCR kits/ month, 1 lakh RNA extraction kits/ month and 1 lakh Viral Transport Medium (VTM)/month.**

Dhiti Life Sciences - Fully indigenous Antibody detection kit **in market**

Molecular Transport Medium (MTM) and Nucleic acid extraction kits developed by Huwel Lifesciencs are available **in market**

Levram - Swabs and VTM are **in market**

ENSURING SELF-RELIANCE
FOR BIOMANUFACTURING

NBRIC
A Make-in-India Initiative

NATIONAL BIOMEDICAL RESOURCE INDIGENISATION CONSORTIUM

A Platform for

Aatmanirbhar Bharat

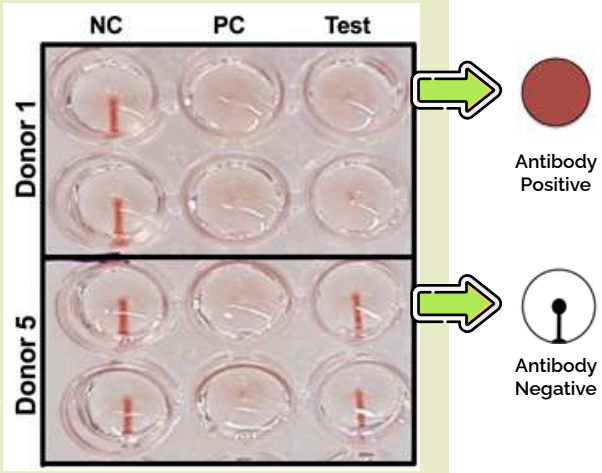
NBRIC is a nation-wide effort for convergence of indigenous resources, products and services towards developing diagnostics, vaccines and therapeutics for COVID-19 and beyond for self-reliance in India's biomedical capabilities.

- Aggregate Demand created for start-ups and forward purchase
- Platform for connecting of component suppliers to large Diagnostic manufacturers
- Complete Indigenization of Diagnostic kits

DEVELOPMENT OF SEROSURVEILLANCE TOOLS AND ANIMAL MODEL

AT DBT-NII

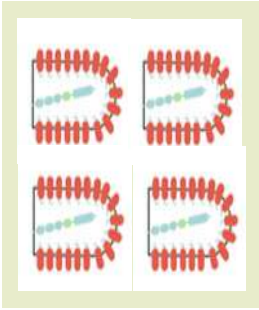
- Development of low-cost point-of-care serology testing.
- SARS-CoV-2 Pseudovirus for vaccine evaluation in BSL-2 settings.
- Animal model for pre-clinical evaluation of vaccines.



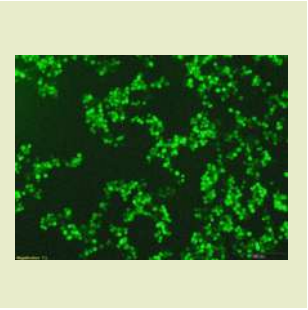
A low-cost point-of-care serology testing of IgG, IgM and IgA in single prick-blood for serosurveillance.

Animal Model hACE2

Animal model for evaluation of vaccines and therapeutics.



SARS-CoV-2 Pseudotyped Virus



Virus neutralization Assay

Flow cytometry and microneutralization based assay for in vitro virus neutralization using SARS-CoV-2 pseudovirus in BSL-2 settings.

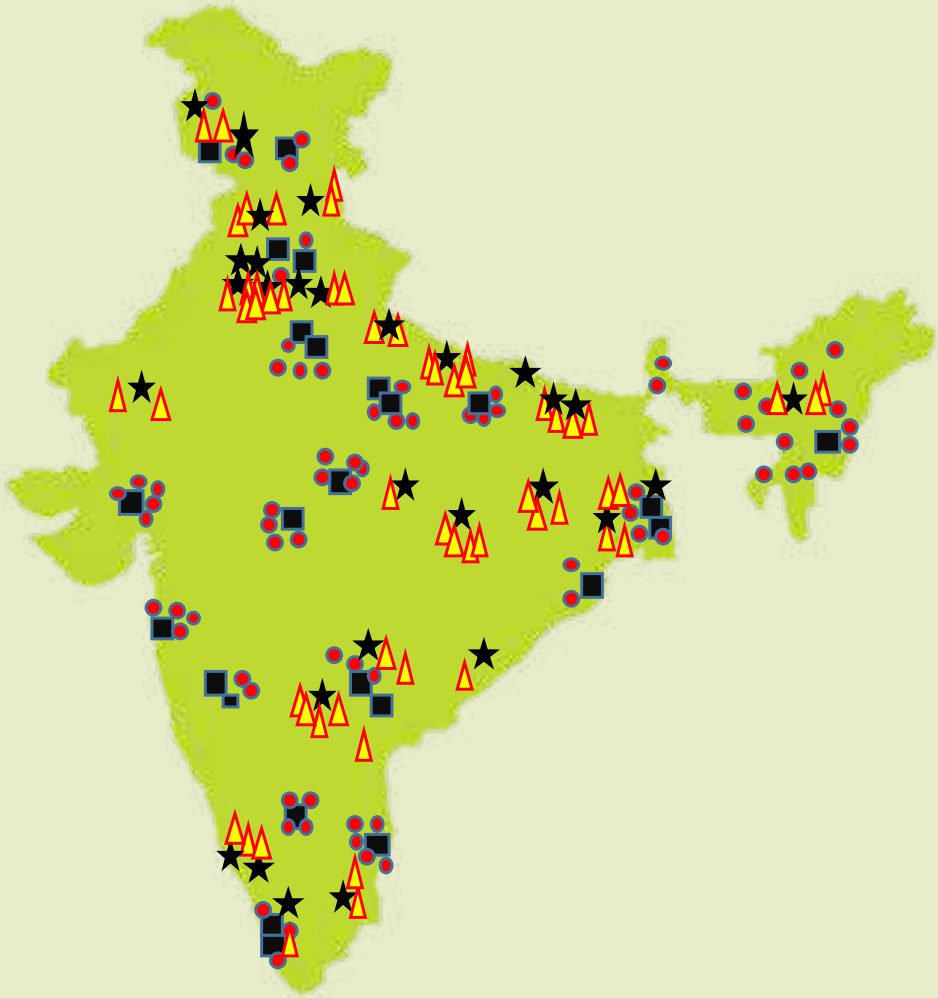
CITY/REGIONAL CLUSTERS
OF TESTING

Set up in a Hub & Spoke Model; In the institutes of eminence under Central and State Governments; To utilize existing capacities for molecular biology / biosafety in the country

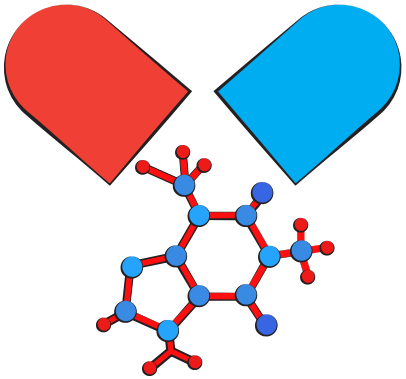
Key Outcomes so far:

21 clusters established, with ***over ~40 testing labs***

So far ***over 27,45,000*** ***samples have been tested as of December 29, 2020***



THERAPEUTICS
PORTFOLIO



DBT-AYUSH partnership

Joint network programme, involving DBT AIs and National Medicinal Plants Board (NMPB) to harness the potential of indigenous medicinal plants for development of plant -based therapeutics to treat COVID-19; 50 plants to be screened

Immunoglobulin based therapeutics

- Immunotherapy of COVID infected patients using therapeutic antibodies from Human or Equine sources
- Start trial of pooled convalescent plasma therapy by 20th October 2020.
- Permission for clinical trial expected by next month equine immunoglobulin therapy

Resources for drug screening

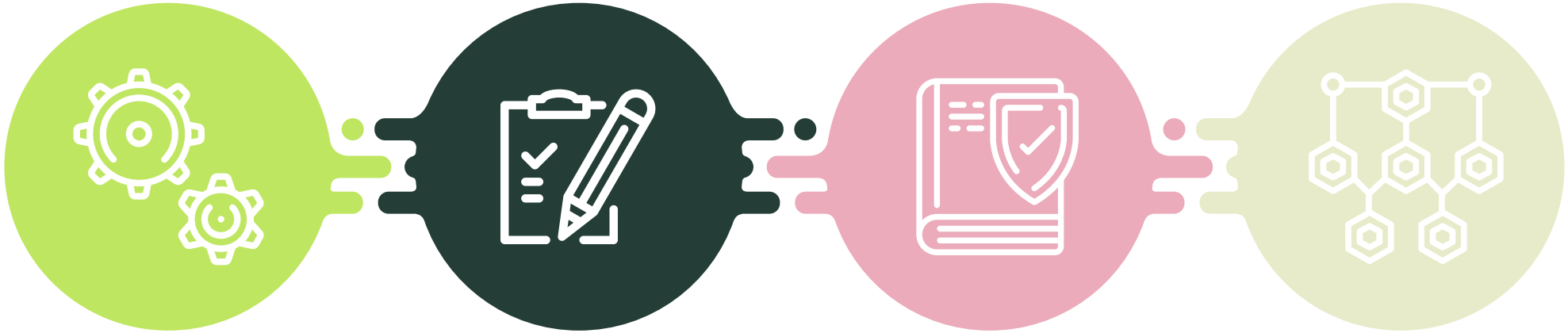
Organoid technology in vitro platform for drug screening and identification of new drug targets

DCGI approved First Phytopharma drug

Phase II clinical trials of AQCH, a phytopharmaceutical drug, developed by DBT-ICGEB along with Sun Pharma initiated. Results expected by October, 2020

BIOSAFETY REGULATION

FOR COVID 19



Rapid Regulatory Response Mechanism

Interim Guidance Document on Laboratory Biosafety to Handle COVID-19 Specimens

Guidelines for Sharing of Bio-specimen & Data for Research on COVID-19

Rapid regulatory framework for fast track processing of applications relating to recombinant vaccines for COVID 19 has been developed

STARTUP SOLUTIONS

Identification

100+ Covid solutions supported through BIRAC's Incubator network

Funding initiatives

50+ Webinars

- *Fund raising*
- *Business mentoring*
- *Regulatory Guidance*
- *Re-Strategize business*

Supported

10,000+ Startups, entrepreneurs, stakeholders reached

192 BIRAC's Incubators/ Stakeholders network

+

150 BIRAC's supported In-Market Startups

→

20 Prioritized In-Market Products from BIRAC supported Startups

COVID 19 PANDEMIC

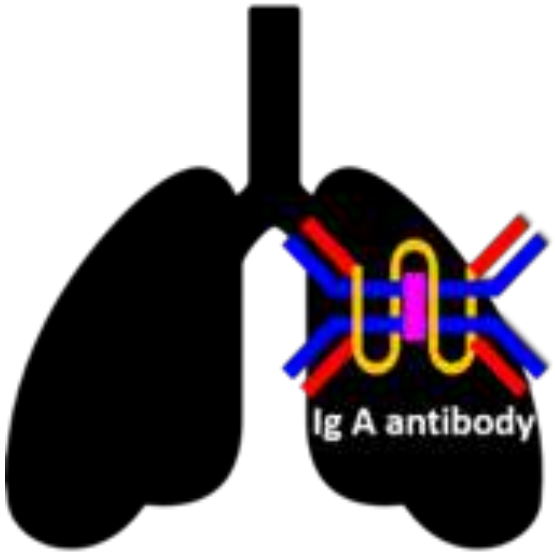
BIBCOL'S ACTION

Bharat Immunologicals and Biologicals Corporation Limited (BIBCOL) developed a sanitizer. 3200 Liters of sanitizer has been produced. Re. 1 on commercial sale of each sanitizer to reach PM CARES Fund.

BIBCOL is also gearing up for introduction of Zinc+Vit (D&C) tablets for improvement of immunity in general for fighting corona and other infectious diseases.

ANTIBODIES AGAINST SARS-COV-2

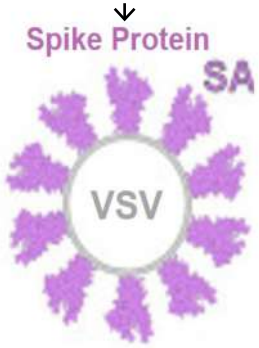
AND PLATFORM FOR VACCINE DEVELOPMENT



DBT-NCCS is exploring possibilities for *generating IgA antibodies against SARS-CoV-2* to protect lungs and mucosal surfaces

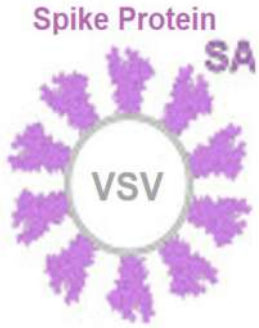
(proof of concept for vaccine candidate)

Pseudovirus generation



Study of humoral immunune response

Pseudovirus neutralization



Production of *pseudotyped SARS-CoV-2 using a VSV platform* for candidate vaccine development and biomedical research use

(BIRAC-funded project by IIT-Indore, in collaboration with DBT-NCCS)

SARS-CoV-2 pseudovirus was generated using a VSV platform. Preliminary experiments indicate that the pseudovirus could elicit an antibody response in an animal model.

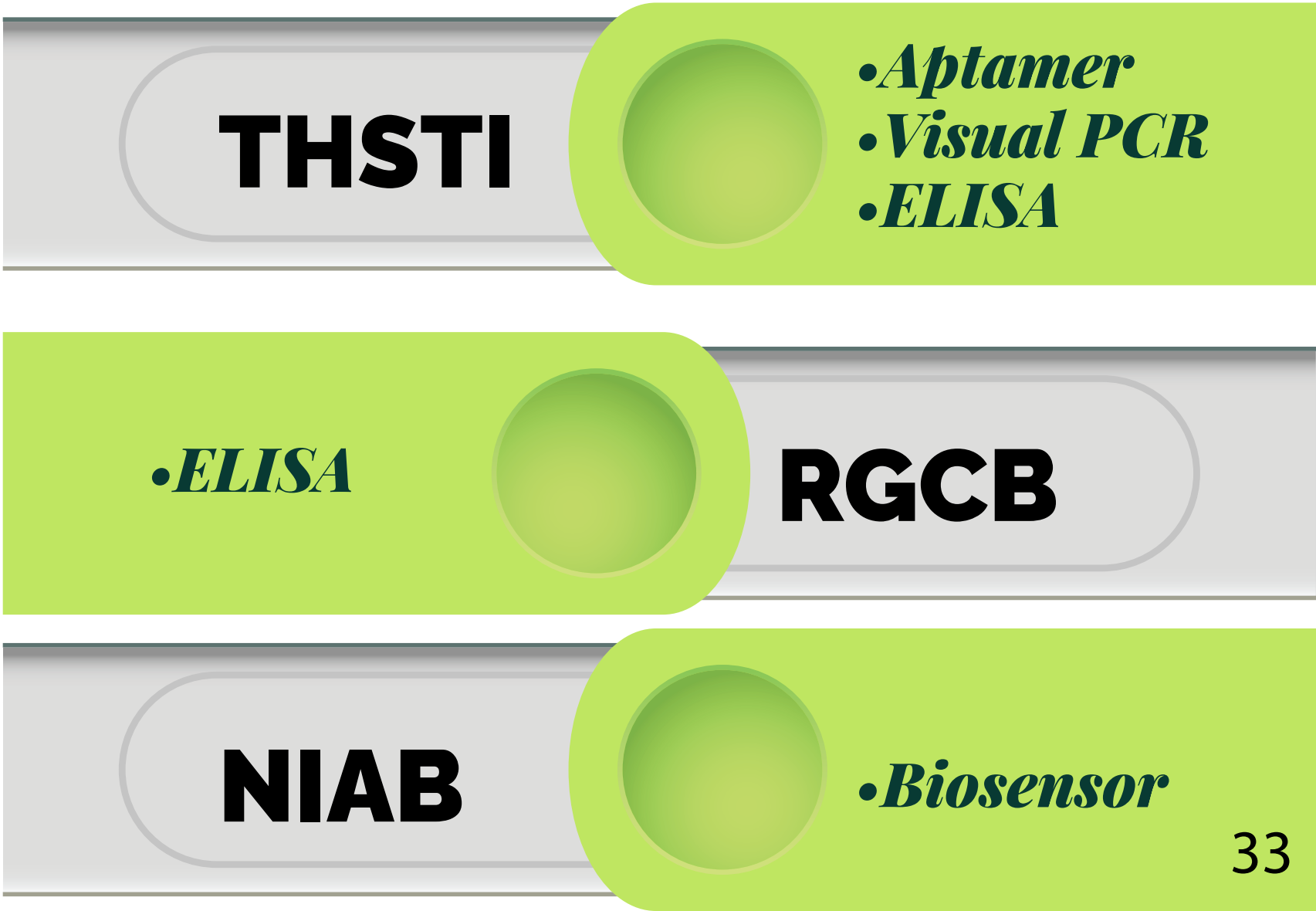
COVID-19

The Virus

Diagnostics

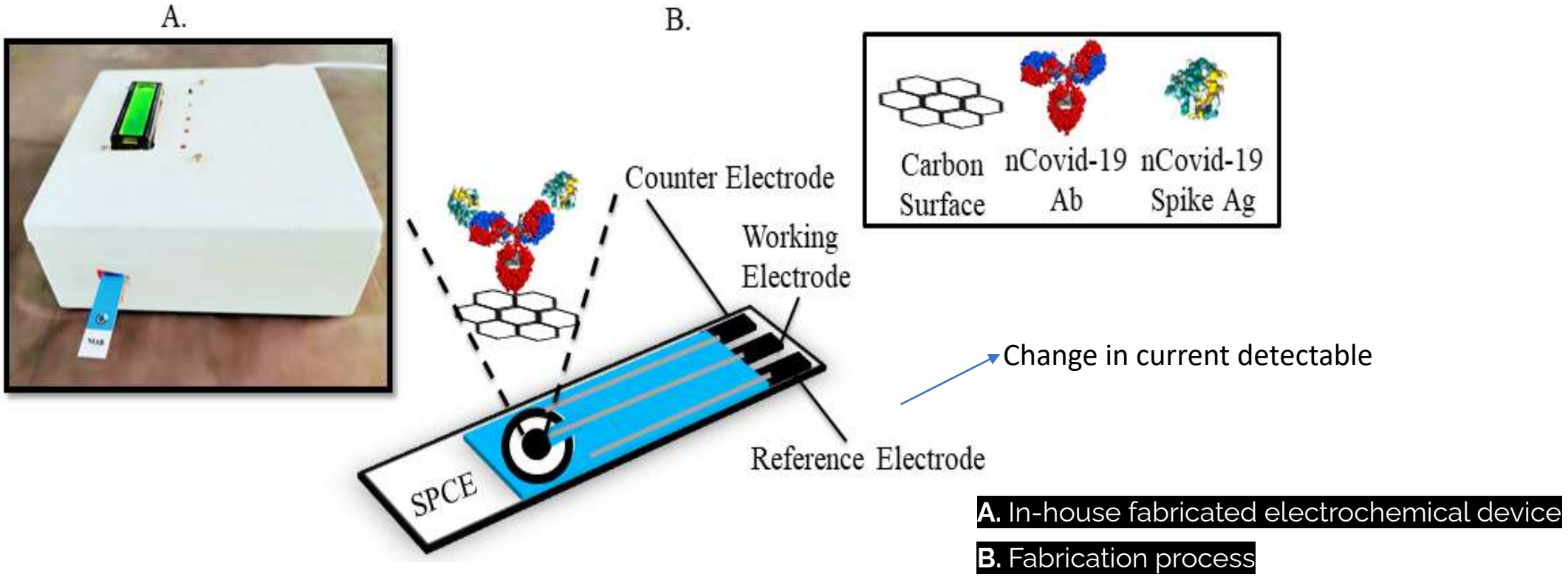
COVID-19 DIAGNOSTIC KITS

DEVELOPED BY DBT AIs



ELECTROCHEMICAL DEVICE FOR ULTRASENSITIVE AND RAPID

DIAGNOSIS OF SARS-COV-2



A. In-house fabricated electrochemical device

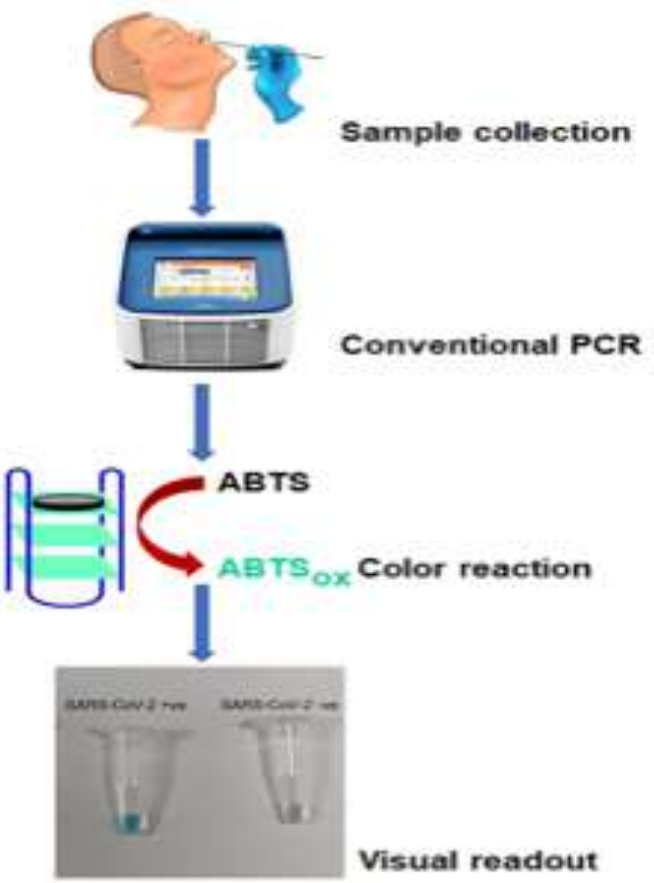
B. Fabrication process

Technology Transferred to Biogenex Pvt. Ltd.

MoU signed for the transfer of technology to M/s Biogenex Life Sciences Private Limited.

EFFORTS ON DIAGNOSTICS

BY DBT-THSTI



DNAzyme-based visual detection method for SARS-COV-2

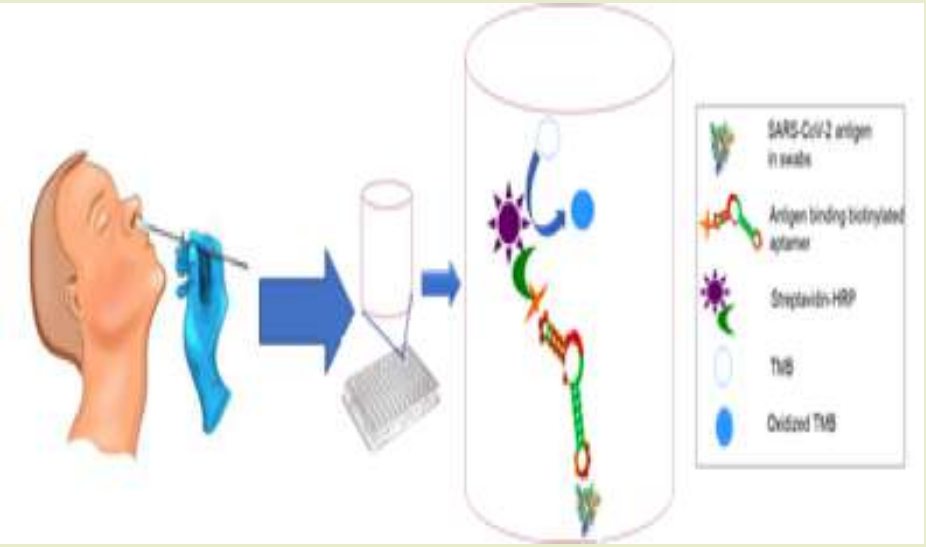
developed that is compatible with conventional PCR conventional PCR.

Technology transferred to Genei Labs, Bengaluru

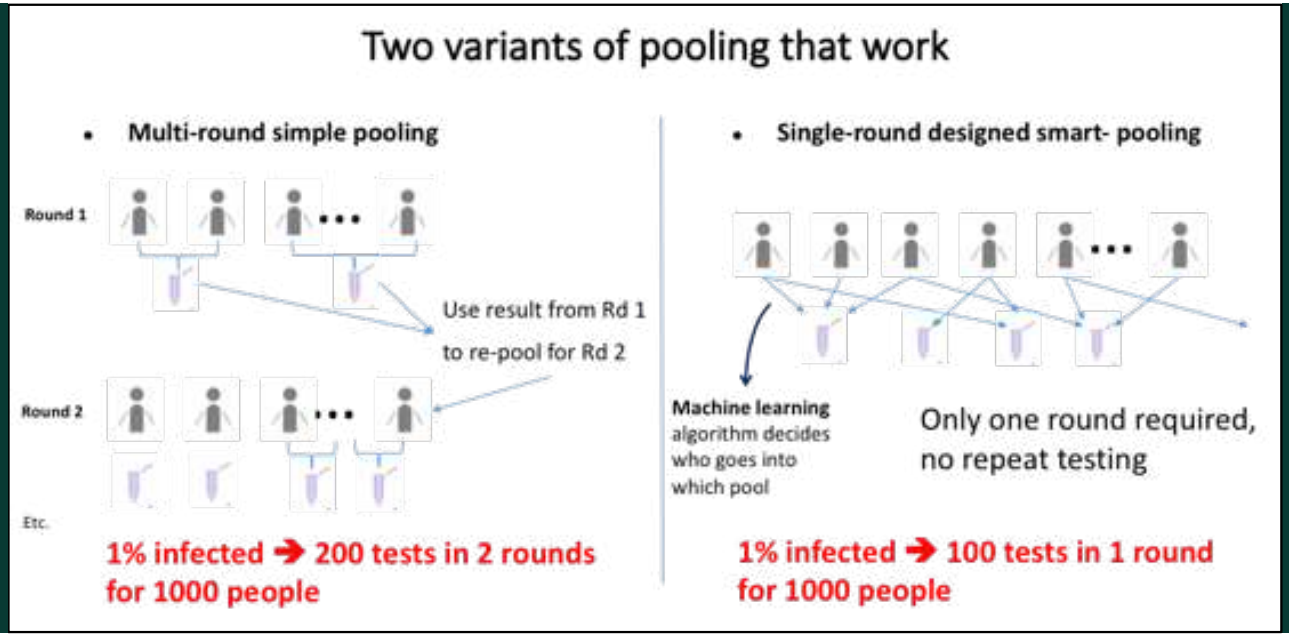
Developed the first

aptamer-based SARS-COV2 detection assay

Technology transferred to Molbio Diagnostics Pvt Ltd.



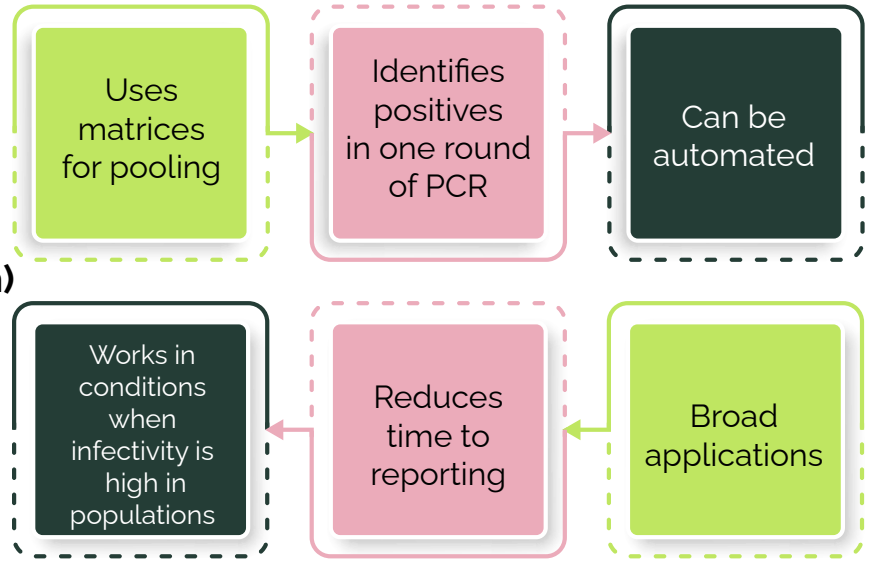
THE SMART POOL
PCR ASSAY



DIAGNOSTICS
New testing protocols

- Pooling strategies are both cost effective and reduce time to reporting
- Simple pooling is ineffective if the rates of infection are >5%.

Smart Pooling
(applying a compressed sensing algorithm)



Samples	RNA extractions	Infection rate	Specificity	Sensitivity	Samples/ Pool	Pipettings
105	45	10%	.998	.99	7	288
320	48	4%	.997	.99	14	576
500	60	2.5%	.999	.99	18	1152
960	93	1%	.9998	1	31	2880

Algorithm
Manoj Gopalkrishnan *(IIT Mumbai)*
Sandeep Krishna *(NCBS-TIFR)*

Validation
Dasaradhi Palakodeti *(inStem)*

COVID-19 diagnostic product developed by Sperogenx Biosciences, Bangalore and POCT Service, New Delhi, in Collaboration with DBT-RGCB

Q-line COVID-19 antigen rapid Test

detects within **30 minutes** at resource limited settings

Q-line® Molecular

Introducing a Comprehensive **COVID-19** Product Range

Q-Line
Molecular (nCoV-19) RT-PCR Detection Kit (E, RdRP & IPC)

- Single tube and multiplex kit for screening & confirmation of COVID-19 by targeting E & RdRP gene.
- Kit consist with Human housekeeping gene as Internal Positive Control (IPC) to ensures human sample availability and quality of nucleic acid for the reference of gene expression.
- Sensitivity: 98.7%.
- Specificity: 100%.
- Store at -20°C.

Q-line
Viral RNA Extraction Kit (Spin Column)

- Silica-based column are used for purification to get high quality viral RNA free from protein & other organic compound impurities.
- Kit consist with RNA carrier molecule to enhance yield and purity level.
- Yield of the Viral RNA Recovery: ≥90%.
- Storage at 15-30° C. (Room Temperature)

Q-Line
Viral Transport Medium (VTM) Kit

- Self-standing 10 ml tube with 3 ml filled medium
- Contains antibiotics and anti-fungal to inhibit bacterial as well as fungal growth.
- Individually packed sterile polyester/Nylon swabs with suitable tip & shape with breakpoint as per collection tube.
- Storage at 15-30° C. (Room Temperature)

Q-line
Viral RNA Extraction Kit (Magnetic Bead Method)

- Magnetic bead are used for purification of nucleic acid.
- Fast and high purity RNA.
- One step washing, reduction of nucleic acid loss, increase the extraction rate, more stable test results are obtained.
- Yield of the Viral RNA Recovery: ≥90%.
- Storage at 15-30° C. (Room Temperature)

R & D :
SperogenX Biosciences Pvt Ltd

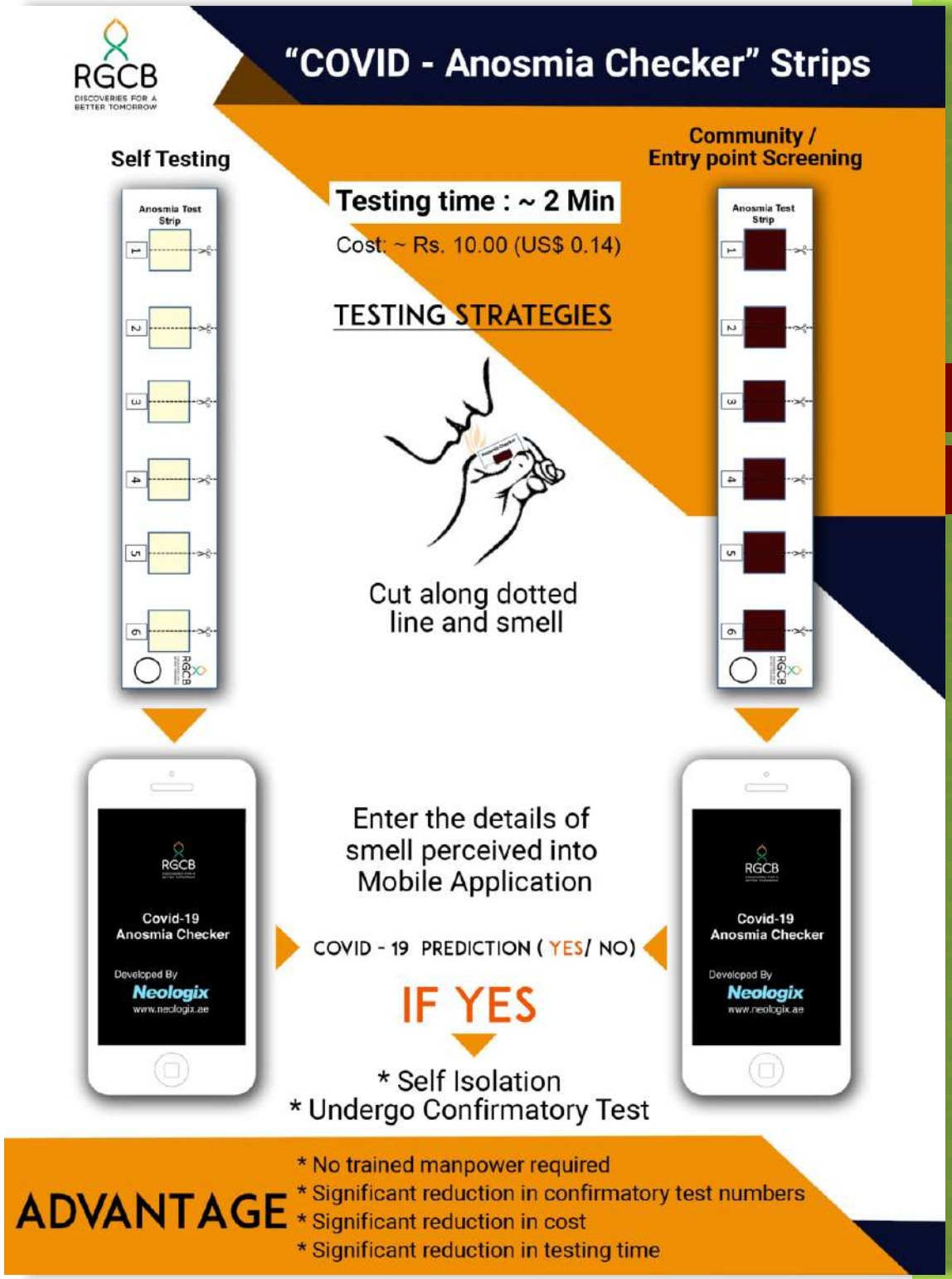
Co-developed with :
RGCB
A joint project of COVID-19 product development with DBT-RGCB & POCT Services

Validated & Approved by ICMR

Manufactured & Marketed By:
POCT SERVICES
Complete Medical Solution

POCT SERVICES PVT. LTD.
20A(Basement), Najafgarh Road,
Shivaji Marg, New Delhi -110015.
INDIA

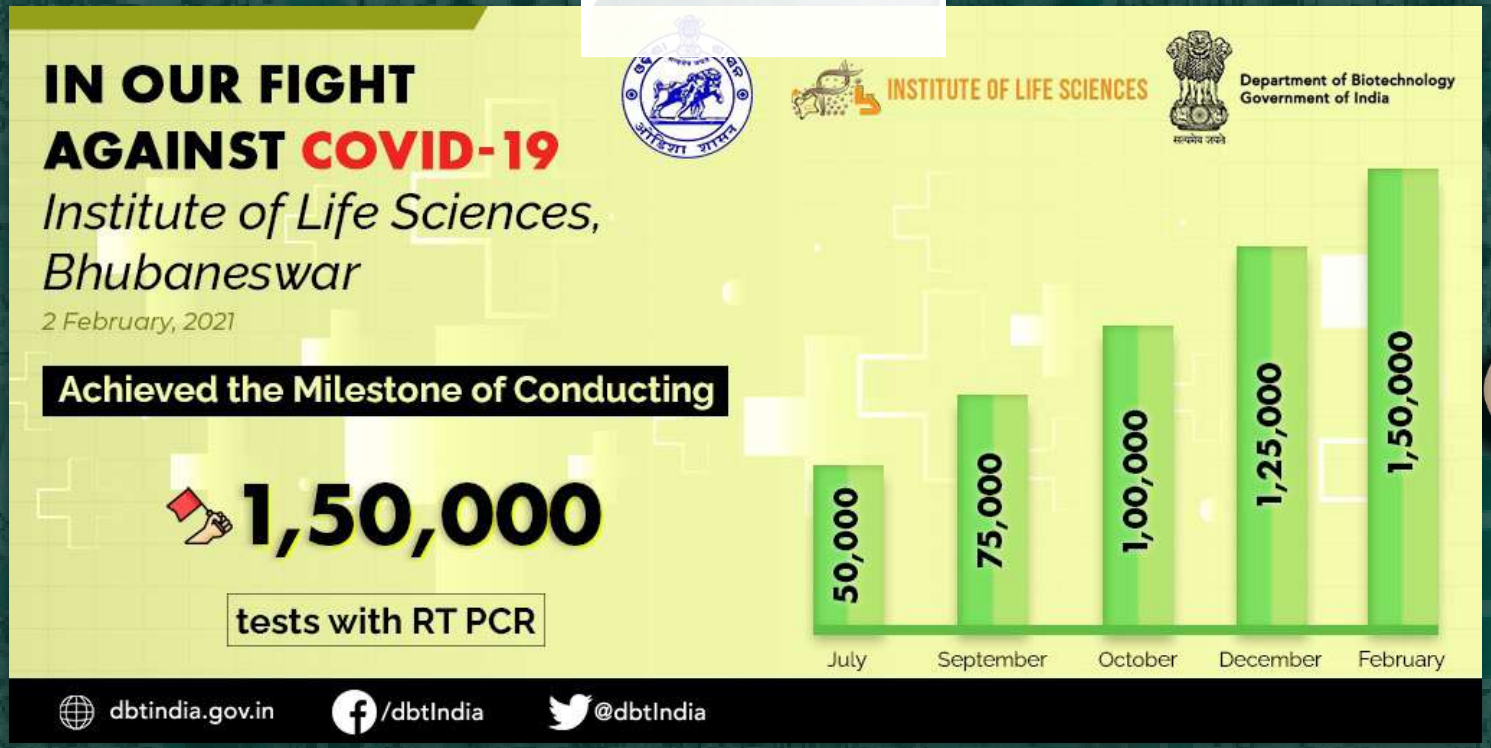
P: 011 4557 7407
E: sales@poctservices.com
W: www.poctservices.com
Toll Free: 1800 123 0079



COVID-19

Anosmia Checker Strips

- **COVID-Anosmia Checker, a quantitative, rapid and low-cost alternative tool for mass screening of COVID-19**
- **Detects both symptomatic and asymptomatic Covid-19 carriers.**
- **100% specificity and 65-70% sensitivity Technology Transferred to Instigator E-Supporting Services Pvt. Ltd.**

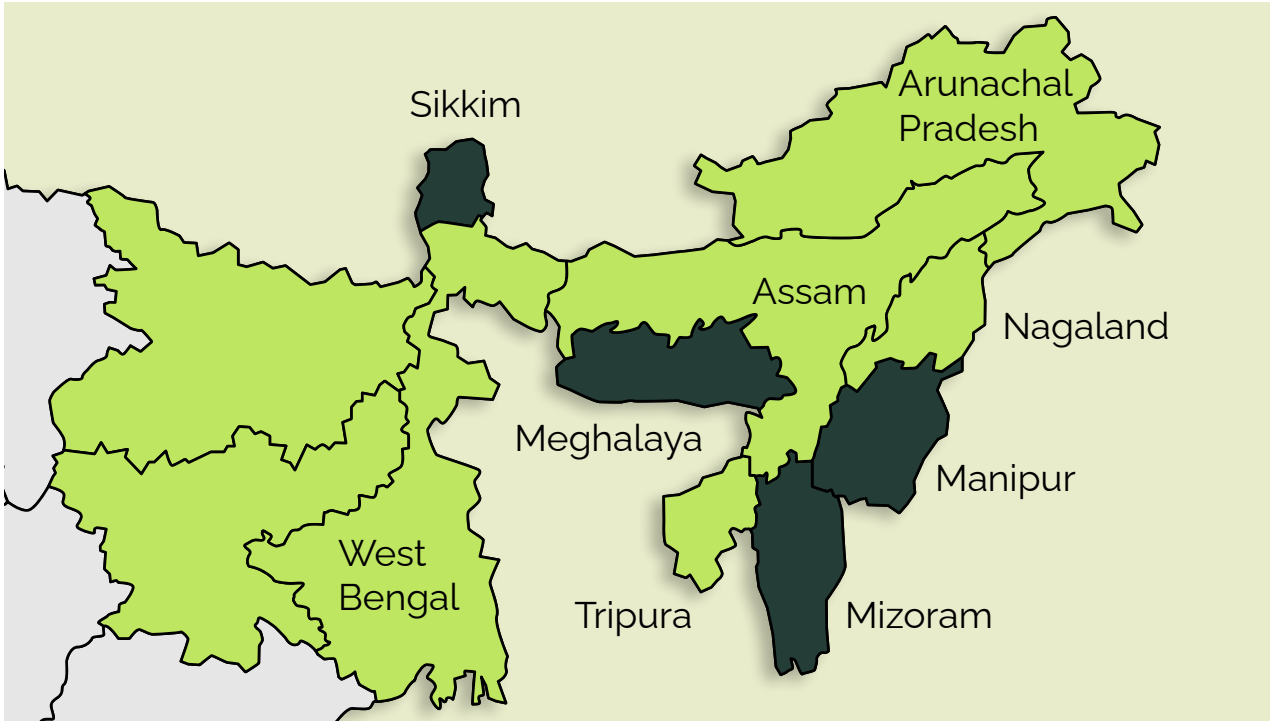

IN OUR FIGHT
AGAINST COVID-19
Institute of Life Sciences,
Bhubaneswar
2 February, 2021
Achieved the Milestone of Conducting
1,50,000
tests with RT PCR
INSTITUTE OF LIFE SCIENCES
Department of Biotechnology
Government of India
50,000
75,000
1,00,000
1,25,000
1,50,000
July
September
October
December
February
dbtindia.gov.in
/dbtIndia
@dbtIndia


Tweet
In our fight against COVID 19
1,50,000
February 2, 2021

DBT- IBSD'S CONTRIBUTION FOR COVID TESTING IN NORTH EAST INDIA

Clustering and supporting North East India COVID-19 testing facilities

- **DBT-IBSD-JNIMS COVID-19 testing laboratory at Imphal, Manipur was established on July 11, 2020.**
- **DBT-IBSD, as the NER Cluster Coordinator for Covid-19 testing facilities has completed the first round of consultation for the 32 DBT-supported laboratories in all 8 NER States, served as spokes with DBT-IBSD as the Hub.**



MANIPUR

DBT-IBSD-JNIMS COVID - 19 Testing Centre, Imphal
IBSD's own testing lab, in collaboration with JNIMS established at Imphal with the approval of ICMR, doing independent testing.

JNIMS, Govt. of Manipur, Imphal
RT-PCR Machine, Equipment and Consumables support, Manpower assistance and Capacity building

Regional Institute of Medical Sciences, Govt. of India, Imphal
RT-PCR, RNA Extraction machine & Manpower support

MEGHALAYA

Govt. Civil Hospital, Tura
Equipment and Consumables support

Pasteur Institute, Shillong
Faciliting development of BSL2 facility, Equipment support and Capacity building

NEIGRIMS, Govt. of India, Shillong
RT-PCR Machine

MIZORAM

Zoram Medical College, Aizawl
RT-PCR Machine, Consumables and Manpower support

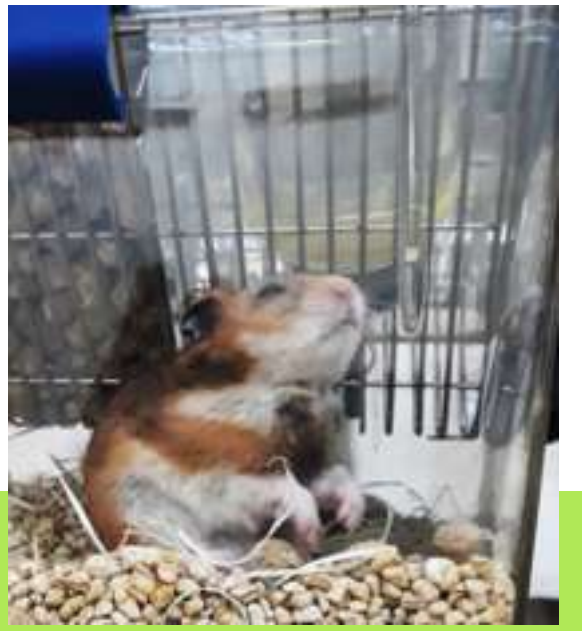
SIKKIM

SNTM Hospital, Gangtok
Consumables support

ANIMAL MODELS FOR

SARS – COV-2

Syrian golden hamsters (*Mesocricetus auratus*)



Established model for SARS-CoV-2 (Chan FJ et al; Clinical Infectious Diseases, 2020)

- To study transmission
- To understand pathogenesis
- To evaluate vaccine candidates
- To evaluate potential therapeutics

K18-hACE2 transgenic mice

Transgenic mice express human ACE2, the receptor used by the severe acute respiratory syndrome coronavirus (SARS-CoV) to gain entry to cells.

- DBT-ILS established **Syrian golden hamsters** (*Mesocricetus auratus*) and K18-hACE2 transgenic mice for SARS-COV-2
- THSTI developed a hamster challenge model for SARS-CoV-2. It is being offered as a service to various vaccine developers to evaluate the efficacy in this model. (*Rizvi ZA et al, 2021*)

PRECLINICAL MODELS
OF DISEASE

Engineering Mouse Models for COVID-19 Research

Initiated in May 2020

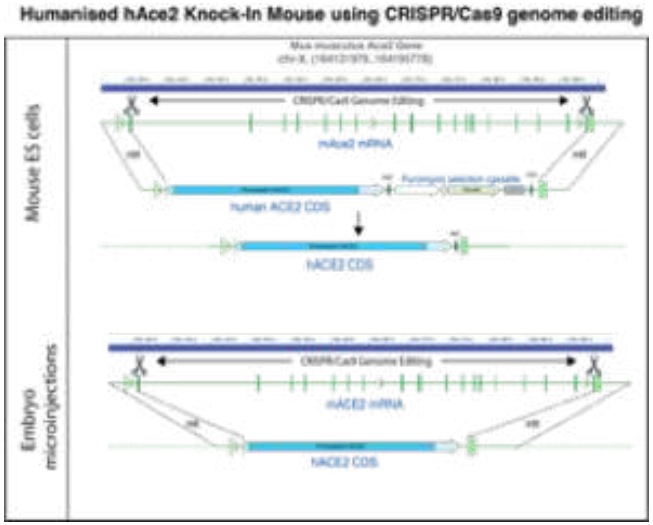
National Mouse Research Resource

National Mouse Research Resource

ncbs
National Centre for Biological Sciences
Tata Institute of Fundamental Research

Mouse Genome Engineering Facility

inStem



K18-hACE2 transgenic mouse

K18-hACE2 transgene plasmid kindly donated by Paul B. McCray et al. who designed the Tg (K18-hACE2) 2Prlmn/J [PMID: 17079315]

Humanized hACE2 knock-in mouse using Crispr-Cas9 genome editing

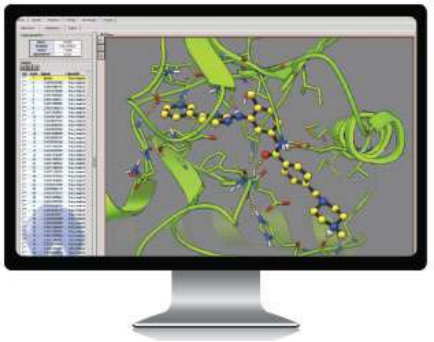
Advantages

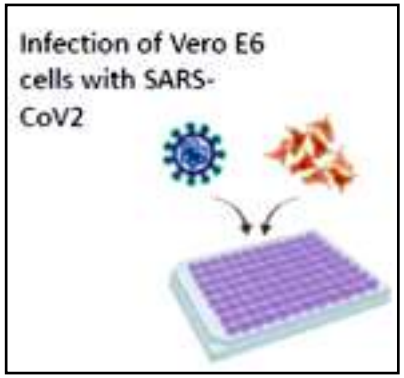
- more accurately represents Ace2 expression (existing mouse does not drive expression in heart, ileum, nasal epithelium)
- Can be used to model post-infection inflammation more accurately
- Available November 2020

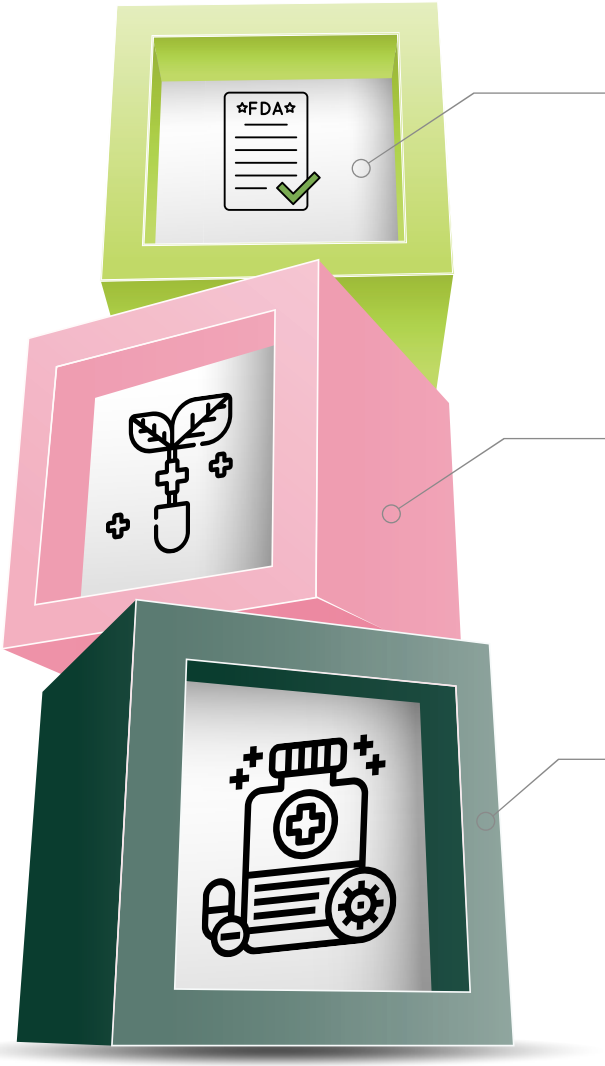
ACE2 knockout mouse

Available November 2020

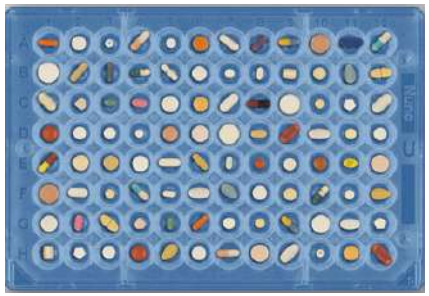
DRUG REPURPOSING AT ILS AGAINST SARS-COV2



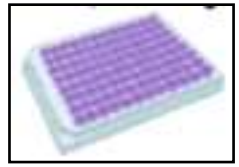




Screening of FDA approved libraries for compounds targeting multiple viral proteins and *in-vitro* validation of identified hits

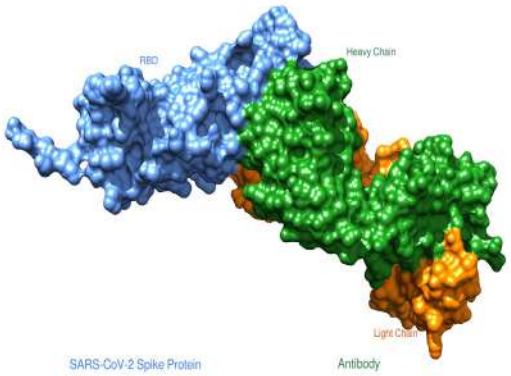


Establishing multipotent synergistic therapeutic combinations



High throughput screening of FDA approved libraries for activity against SARS-CoV2 Proteases (PL_Pro & 3CL_Pro) and RDRP using real-time fluorogenic kinetic assays

COVID-19
THERAPEUTICS

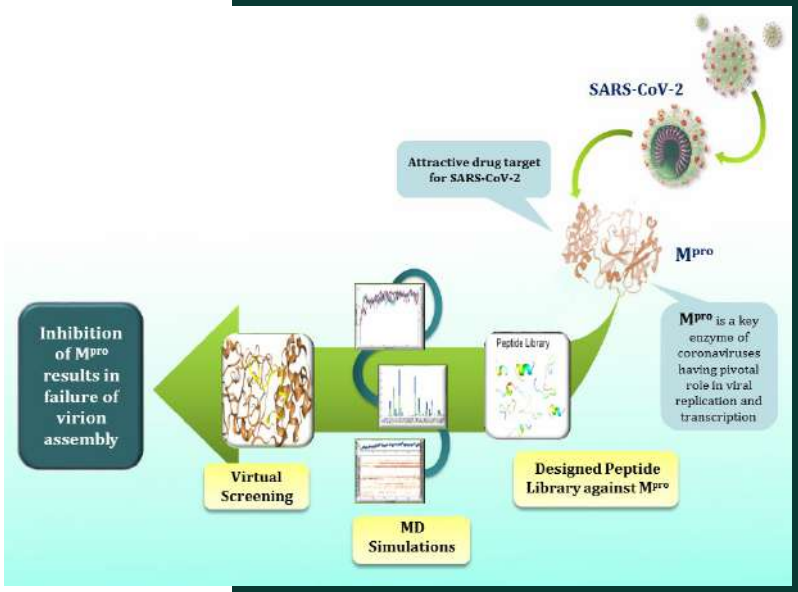


Generation of virus-neutralizing human monoclonal antibodies against SARS-CoV-2 as potential therapeutics

DBT-NCCS has generated clones secreting human monoclonal antibodies (mAbs) against SARS-COV-2. These were transferred to an industry partner for further testing and development, which is being done in association with IIT Indore and PredOmix Technologies Pvt. Ltd.

Peptide-based therapeutics using machine learning

Using machine learning DBT-NCCS has identified peptides with therapeutic potential to target the Mpro protein of the COVID-causing virus (published in BBA Molecular Basis of Disease), which are being tested by an industrial partner



COVID-19

THERAPEUTICS CALL

IDBT and BIRAC jointly announced a request for proposals in the area of Covid-19 Therapeutics in Oct 2020 for:

- Development of therapeutics to address a rapid response towards the current COVID-19 outbreak.
- Development of therapeutics to address the current and/or future coronavirus outbreaks.

7 proposals were recommended for funding subject to legal, IP and financial clearance. One project aims at Repurposing Anakinra for Treatment of Moderate to Severe Cases of COVID-19. This drug may also be useful for management of autoimmune disease like rheumatoid arthritis.

DBT- IBSD'S CONTRIBUTION FOR COVID TESTING IN NORTH EAST INDIA

IBSD has shared RT-PCR machine to Zoram Medical College, Aizawl, which was airlifted by Govt. of Mizoram from Imphal. This has doubled the testing capacity of Mizoram.

Receival of IBSD's RT-PCR machine by Mizoram State Directorate of Science and Technology

RT-PCR machine of IBSD installed and utilised for COVID19 testing at Zoram Medical College, Aizawl

IBSD team at DBT-IBSD-JNIMS Covid-19 testing laboratory at Imphal, Manipur

DBT- NBRC'S RESEARCH FOR COVID-19

REMEDIES THROUGH AYURVEDA

- A triterpene glycoside compound of ***Yashtimadhu or Mulethi (Glycyrrhiza glabra)*** is recognized for potential immunomodulating, anti-inflammatory, hepatoprotective, and antineoplastic activities.
- This triterpene inhibited cytokine storm as well as SARS-Cov2 replication significantly

ECONOMICAL DEVICE TO HELP DETECT ASYMPTOMATIC COVID-19 CASES

- DBT/Wellcome Trust India Alliance fellow, Dr Nixon Abraham, at Ministry of Education's IISER Pune designed a custom-built olfactory-action meter that can be used to detect asymptomatic COVID-19 cases.

- This new method identified olfactory dysfunction in 82% of asymptomatic COVID-19 carriers. In comparison, only 15% of the same set of patients reported a loss of olfaction in self-reporting paradigms.

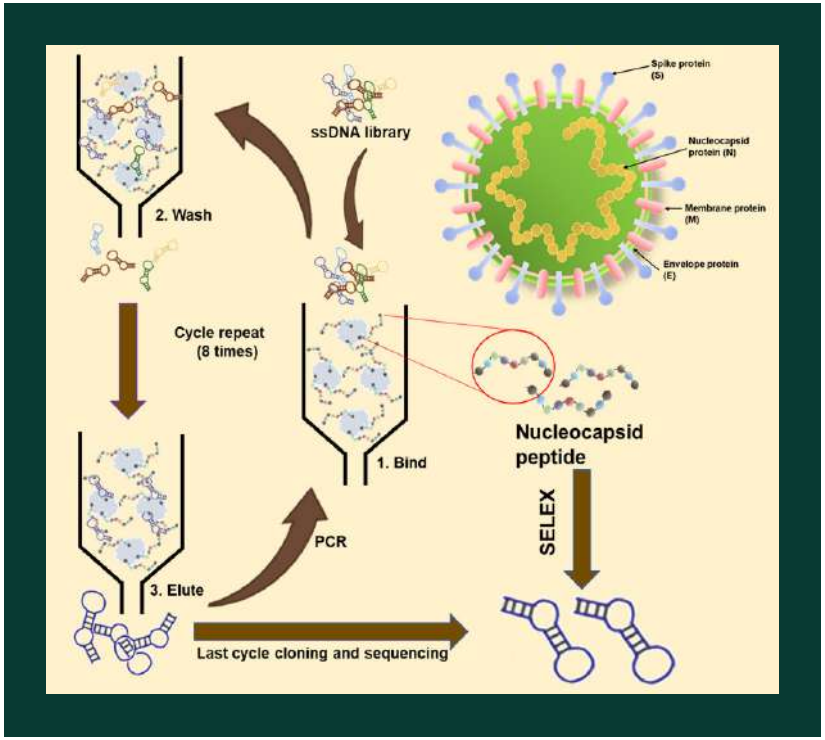
ECONOMICAL DEVICE TO HELP DETECT ASYMPTOMATIC COVID-19 CASES

- DBT/Wellcome Trust India Alliance fellow Dr Mohan C Joshi atJamia Millia Islamia (JMI), New Delhi, designed RNA extraction free saliva - based detection technology for COVID-19, MI-SEHAT (Mobile Integrated Sensitive Estimation and High-specificity Application for Testing)

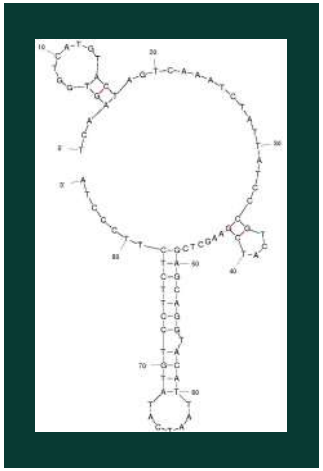
- To be used as point of care (POC) device for COVID-19 detection in the field with a provision for at home testing.

EFFORTS ON DIAGNOSTICS

BY “DBT-NABI”

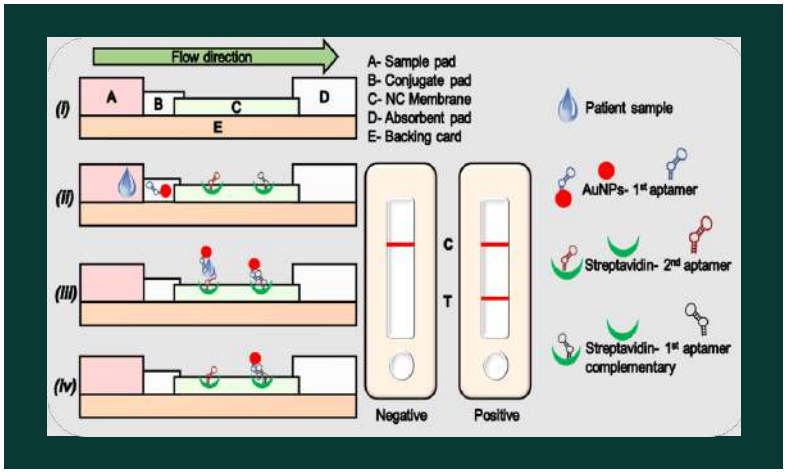


DNA Aptamer- Gold nanoparticles Based Lateral Flow Assay Biosensor For SARS-CoV2 Virus Detection Using Nucleocapsid Peptide As Biomarker

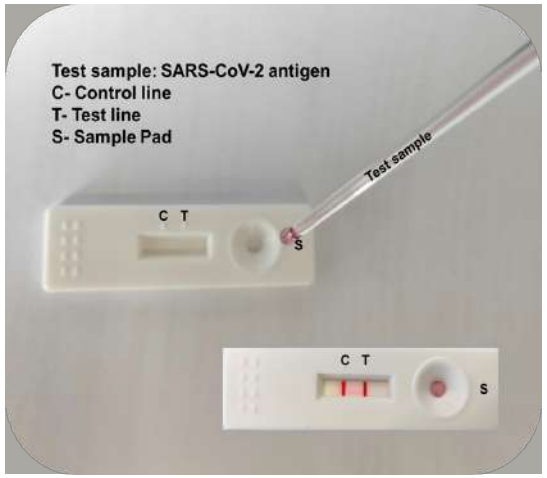


Aptamer as an efficient detection tool

Gold Nanoparticles used for visual signal



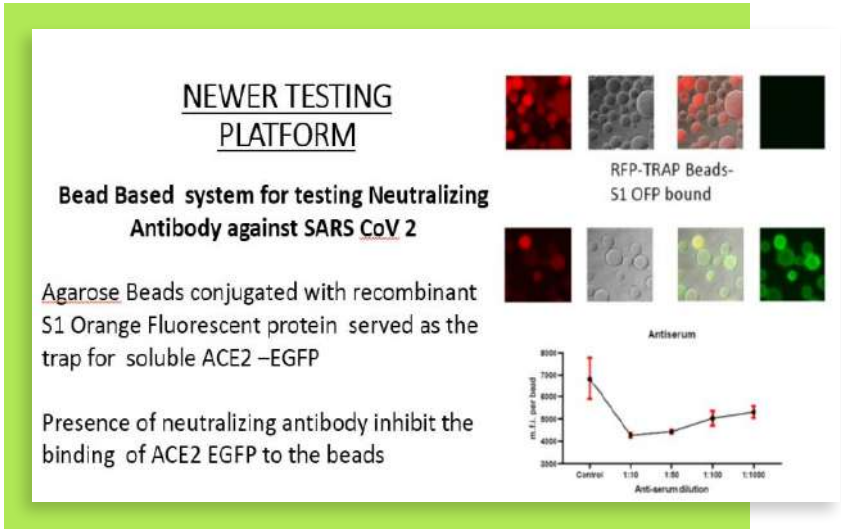
Lateral flow Strip for SARS-CoV2 detection

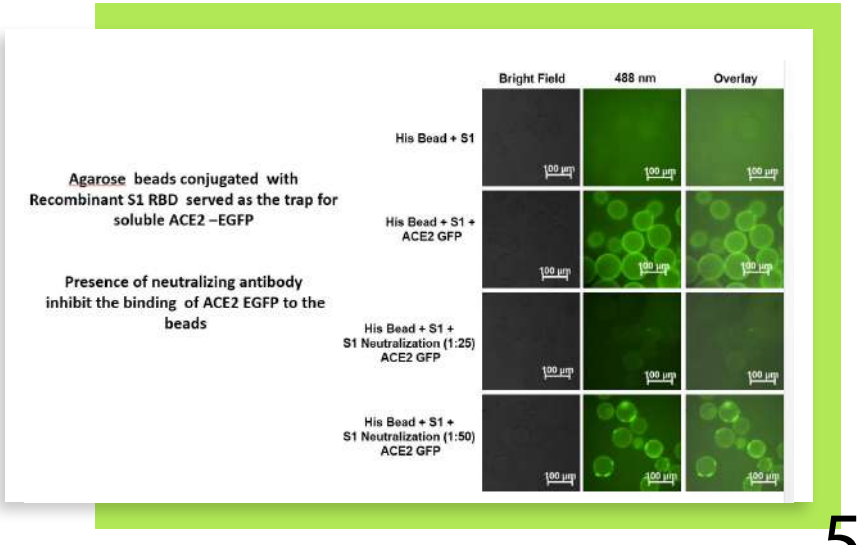


RGCB DEVELOPS A BEAD-BASED ASSAY FOR RAPID DETECTION OF COVID -19 NEUTRALIZING ANTIBODY

POTENTIAL APPLICATION IN VACCINE EFFICACY TESTING

- Developed a bead-based assays that utilizes recombinant protein immobilization on beads with affinity tag or nanobody
- Nanobody mediated capture of orange fluorescent protein tagged Spike (SI) protein of SARS-CoV-2 on agarose beads
- This bead served as the trap for soluble recombinant EGFP ACE-2 that is inhibited by neutralizing antibody
- A more simplified system utilized recombinant RBD bead to trap soluble ACE2 EGFP.
- Both the assays are rapid, cost effective, sensitive and adaptable for multiple detection platforms

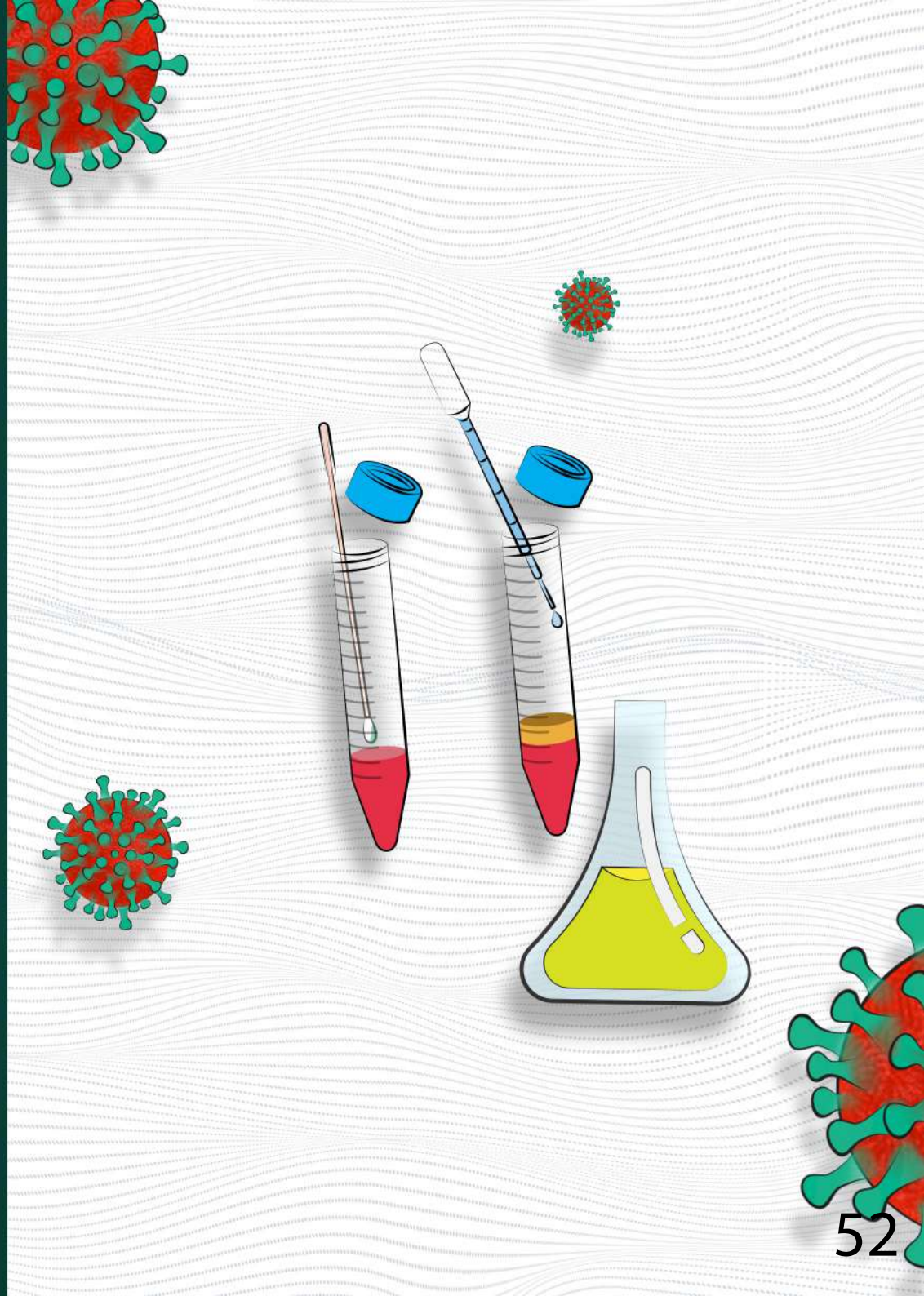




COVID-19

The Virus

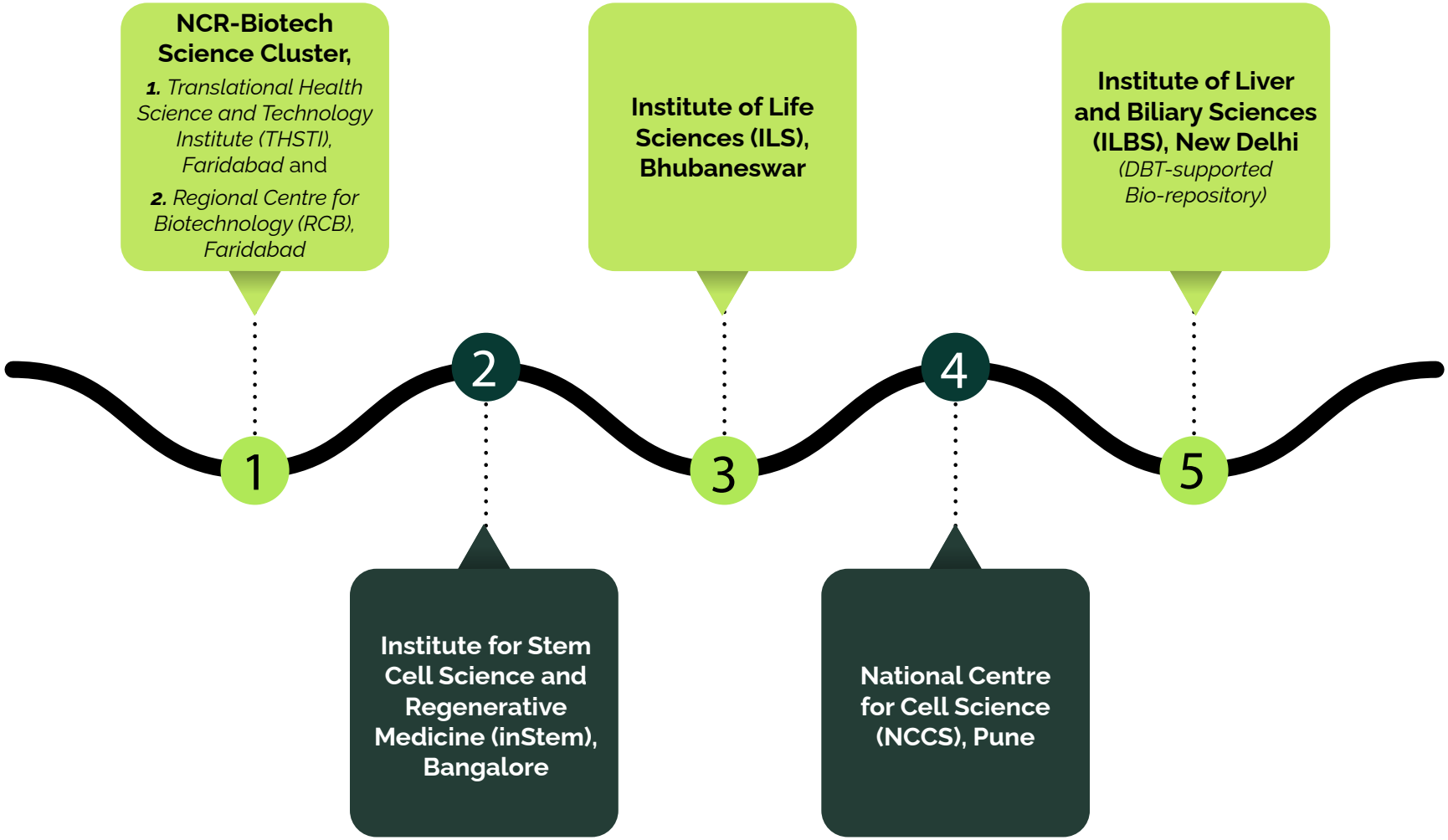
Biorepositories



DBT'S BIO-BANKS

FOR COVID-19

41790 clinical samples and 17 viral isolates collected; ~6000 biospecimens shared for > 30 requests from academia and industry



INSTITUTE OF LIFE SCIENCES

BIOREPOSITORY FOR COVID-19

Quality assessment and selection of samples for storage

VIRUS

- Viral aliquots
- Viral Cultures
- Viral RNA

BLOOD

- Plasma
- Serum

OTHERS

- Sputam
- Stool
- Orophyryngial Swab
- Urine

To establish organized and dedicated biorepositories of well characterized clinical samples of COVID-19 patients

To use these samples to promote research and development towards indigenous diagonstics, theraputics and vaccines

To promote academia, industry and commercial enetities for developing novel solutions for COVID-19 prevention control and treatment

To conduct research to better understand the COVID-19 disease in the Indian scenario.

208 Individual COVID-19 patient samples collected	Serum	Oropjaryngeal/ Nasopharngeal swab	Urine and Stool/ Rectal Swab	Oropjaryngeal/ Nasopharngeal swab
• Symptomatic: **81** • Asymptomatic: **127** • Non-COVID: **65**	Day 0-5 and 8-10 of hospitalization (> 1 month has been planned)	Day 0-5 and 8-10 of hospitalization	Day 0-5 of hospitalization	-

THE NEW INDIAN EXPRESS | COVID-19

02 BHUBANESWAR TUESDAY 26.05.2020

ILS to set up biorepository for coronavirus research

EXPRESS NEWS SERVICE
@Bhubaneswar

THE Institute of Life Sciences (ILS), Bhubaneswar, an autonomous institute under Center's Department of Biotechnology, will establish a biorepository unit here for collection and storing of Covid-19 clinical samples.

The unit will be one of the 16 repositories to be established by the Centre in different parts of the country to improve Covid research. The facility will be used for collecting, storing and maintaining

Ajay Parida said, "Access to such samples will help in developing validated diagnostics, therapeutics and vac-

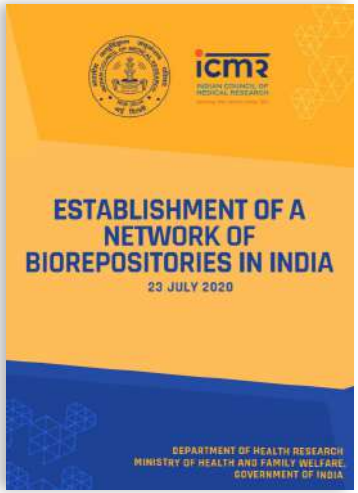
commercial entities involved in development of diagnostics, therapeutics and vaccines.

However, ILS Bhubaneswar officials said this can be only done after complete verification of the purpose of the request and its benefit to the country. The purpose of sharing clinical specimens by each biorepository and their intended use will be examined by the National Oversight Committee as well as the Institutional Human Ethics Committee.

The ILS Bhubaneswar has

SERVICES PROVIDE BY THE NATIONAL CELL REPOSITORY OF DBT-NCCS

TO FACILITATE THE NATIONAL EFFORTS AGAINST COVID-19



Biorepository for COVID bioresources

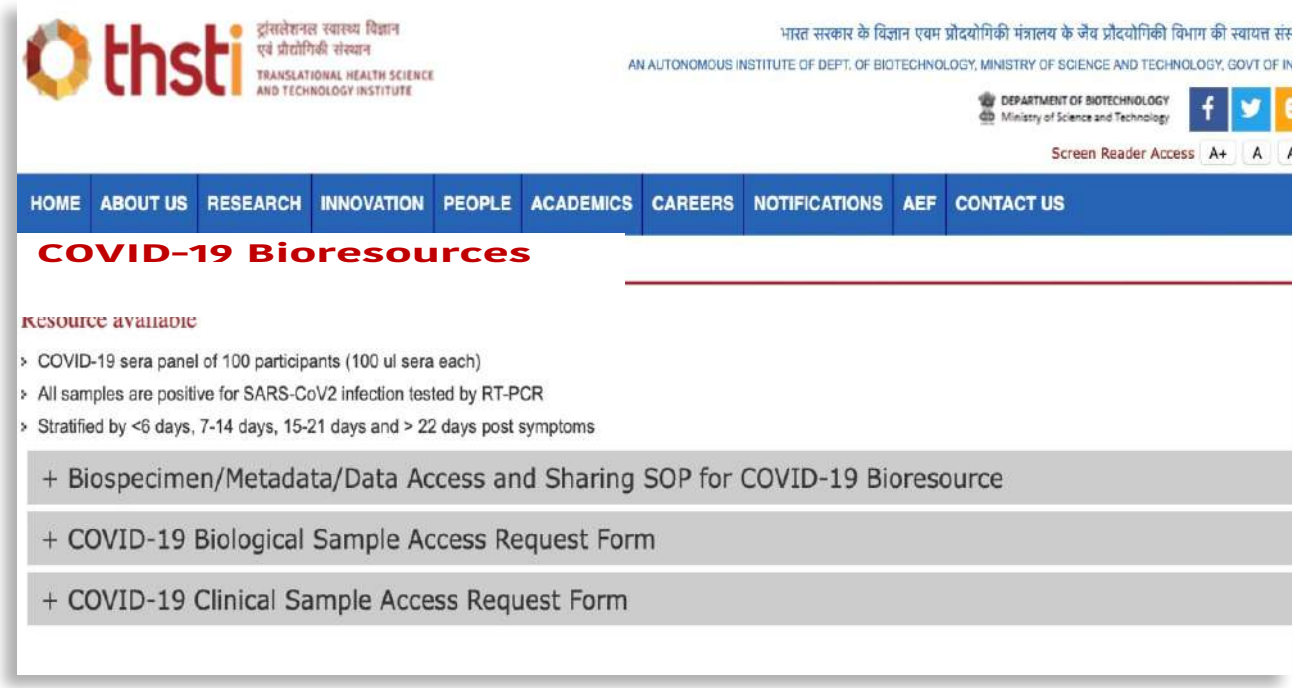
- The national cell repository of DBT-NCCS has set up a biobank to preserve and share COVID-related bioresources for research.
- 127 samples of peripheral blood mononuclear cells (PBMCs) and plasma from SARS-CoV-2 infected and convalescent COVID patients have been preserved at NCCS so far, in association with the B.J. Medical College, and the AFMC, Pune.

Providing cell cultures to facilitate COVID-related research

- 24 cell cultures have been supplied to 15 organizations across India (national research organizations, medical college, University and industry).

DBT- THSTI NATIONAL BIO-RESOURCE

CENTRE FOR COVID-19



31 requests

(academia & industry),

5900 samples

shared

IN-HOUSE DEVELOPMENT

- Antibody detection kit (IgG, IgA)
- Antigen detection kit

OUTCOMES

Technology transfer

- Antibody kit to Xcyton Diagnostics
- Antigen kit to MolBio Diagnostics

APPLICATIONS

- Evaluation of longitudinal antibody response
- Multiple sero-surveillance studies (Mumbai, Pune, AIIMS-Delhi, Palwal)
- Serological evaluation in fragile population: pregnancy for transplacental transmission & breast milk (ORCHESTRA)

INTERDISCIPLINARY EFFORT :

DBT CONSORTIUM FOR COVID-19 RESEARCH

	Day 0	Day 10-28	6-10 weeks	6 months	12 months
COVID-19 cohort	Clinical data: Contact history, symptomatology, comorbidities, hospitalization & treatment history, clinical outcomes				
	Blood (10 mL), NP/OP		Blood (25 mL) (Serum, PBMCs)		

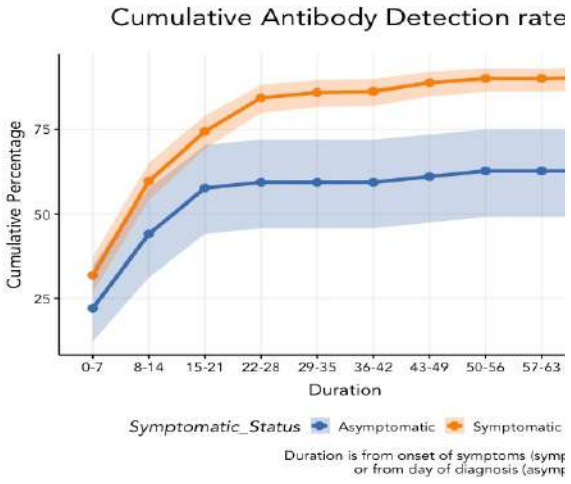
DBT AI: NCR Biotech Science Cluster (THSTI, RCB, NII, ICGEB); DU-South campus: Coordinated by THSTI
Hospitals: LNJP, ESI hospital, GCH, Al-Falah, SGT medical college, Medanta hospital, LHMC

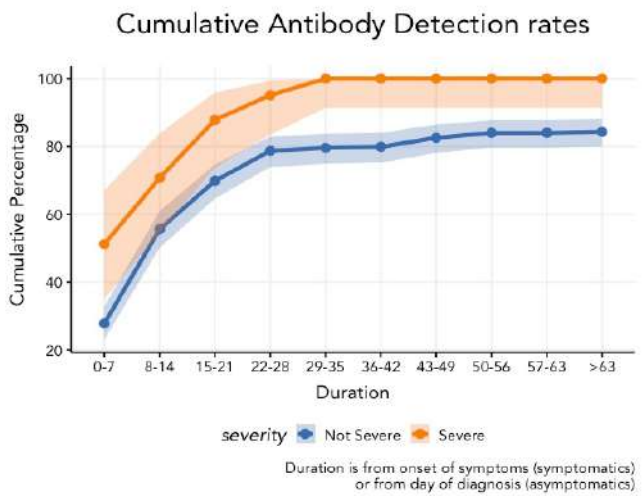
4179 enrolled; 3040 positive

Proportion of severe COVID: 21.7%

INTERCOVID (42 sites from 22 countries; 200/2000 women from India) : Women with antenatal SARS-CoV-2 at higher risk for preeclampsia, PTB, perinatal complications

Longitudinal immune analysis (Humoral):





Seroconversion rates: Asymptomatic: 65%; mild-moderate 90%, severe 100%

Cellular immune response being evaluated

COVID-19

Therapeutics and Genome Analysis

TESTING OF ANTIVIRALS AGAINST

SARS-COV-2 AT DBT- RCB

DBT-RCB has set an in vitro cell culture-based assay to test the antiviral activity of potential molecules against SARS-CoV2.

Services have been widely utilized by the academia and industry

Cytotoxicity Testing

1299 *samples*

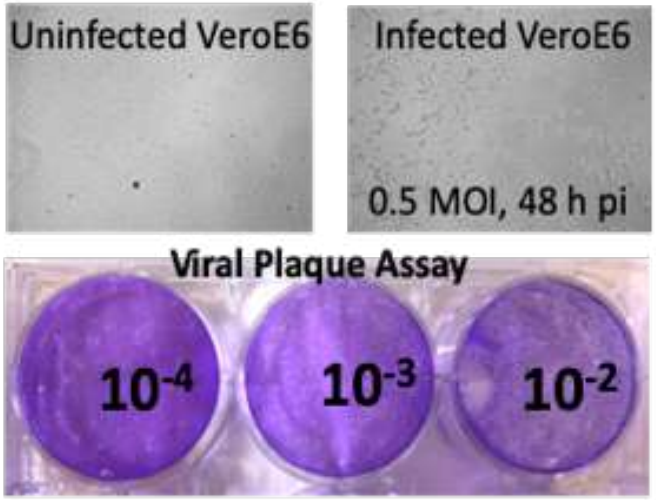
Antiviral Testing

509 *samples*

IC50 determinations

21 *samples*

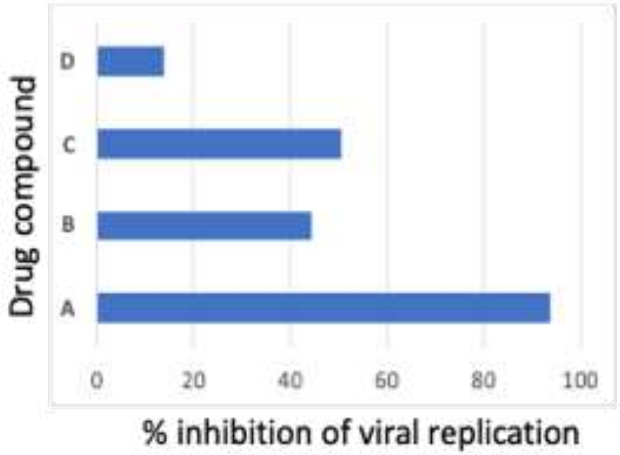
SARS-CoV-2 WA-01/2020 Strain Growth in Vero E6 cells



	Ct values		
	E	RdRp	N
Uninfected	34.394	28.358	32.1
Infected 24 h	22.94	23.75	22.675
Infected 48 h	16.846	17.615	17.34
Infected 72 h	13.656	14.22	13.918

Testing of antiviral activity Against SARS-CoV-2

Drug compound	Ct values			Mean Ct	dCt	% inhibition
Control	21.173	21.036	21.52	21.24		
A	25.193	25.131	25.48	25.27	4.02	93.83
B	23.357	21.666	21.26	22.09	0.85	44.44
C	21.548	22.656	22.59	22.26	1.02	50.50
D	21.283	21.69	21.41	21.46	0.22	13.79



ILS HAS ESTABLISHED 17 VIRUS CULTURES

We have isolated viruses from four clades

Clade 19A	**5 isolates**
Clade 19B	**3 isolates**
Clade 20A	**5 isolates**
Clade 20B	**4 isolates**

THE NEW INDIAN EXPRESS

ILS establishes in-vitro cultures of corona

EXPRESS NEWS SERVICE
@ Bhubaneswar

INSTITUTE of Life Sciences (ILS), Bhubaneswar has successfully established in-vitro cultures of coronavirus from the patient samples using vero cells.

The vero cell culture technology is used worldwide to develop cell-based vaccines. At least 17 virus cultures have been established from swab samples with varying virus loads collected from different locations of the country.

The virus cultures have been established by scientists Dr Soma Chattopadhyay and Dr Gulam H Syed as per interna-

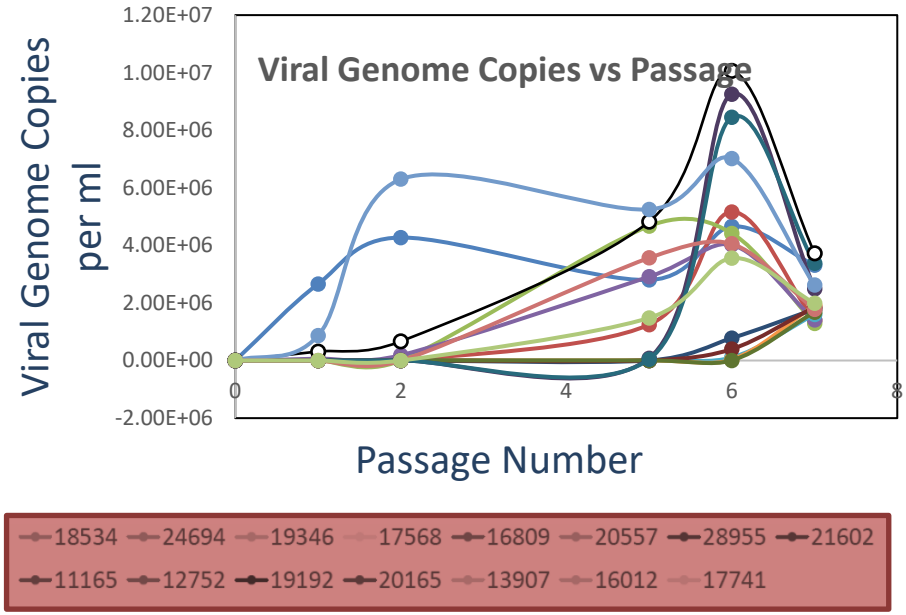
In-vitro culture of coronavirus at ILS

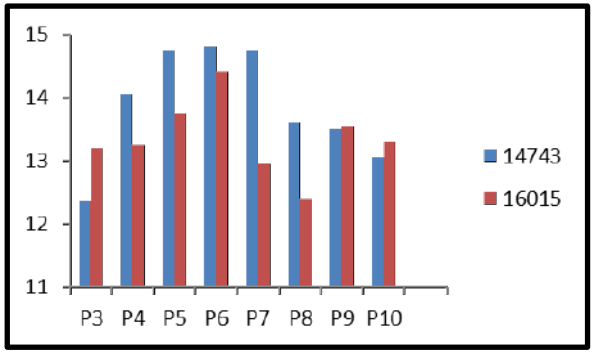
passages were estimated by Foci-Forming Unit (FFU) assay.

Infection of the vero cells with SARS-CoV2 clinical isolate was also confirmed by immunofluorescence detection of

tial application in testing and screening for possible drug targets, formulations as well as possible use in vaccine development. Cultured SARS-CoV-2 can also be used in developing antibodies or anti-dotes, testing of antibodies and identification of effective therapeutic agents," he said.

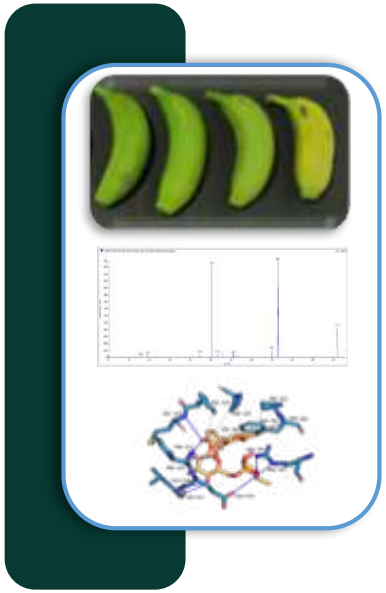
Dr Parida expressed confidence that the virus culture will be a useful resource for the country in the fight against Covid-19 pandemic. It will also help academicians as well as industry for testing and validating various antiviral products contributing to diagnostic, cure and management of the pandemic, he said.





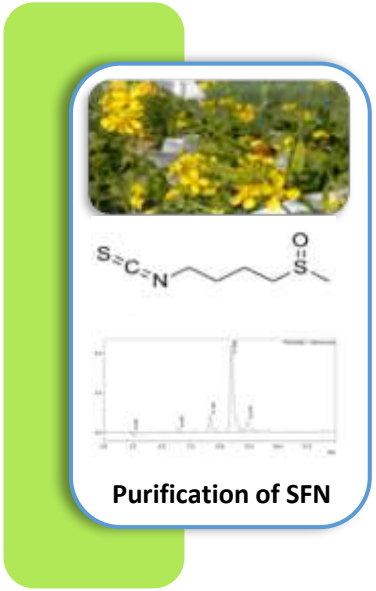
qPCR result of Spike gene of passage 3-10 of 14743 and 16015 strains

PLANT PRODUCED FLAVONOIDS AND GLUCOSINOLATES
AS ANTI SARS-COV2 AGENTS BY DBT-NIPGR



Plant secondary metabolites, flavonoids, as anti SARS CoV2 agents

- In silico studies indicate binding of 38 molecules out of 6000 flavonoids to coronavirus protease (Mpro)
- 6 most potential flavonoids (Kaempferol, Kaempferol 3O rutinoside, Quercetin, Rutin, Myricetin) are currently being tested for anti-viral activity in cell cultures and subsequently in animal models in collaboration with RCB

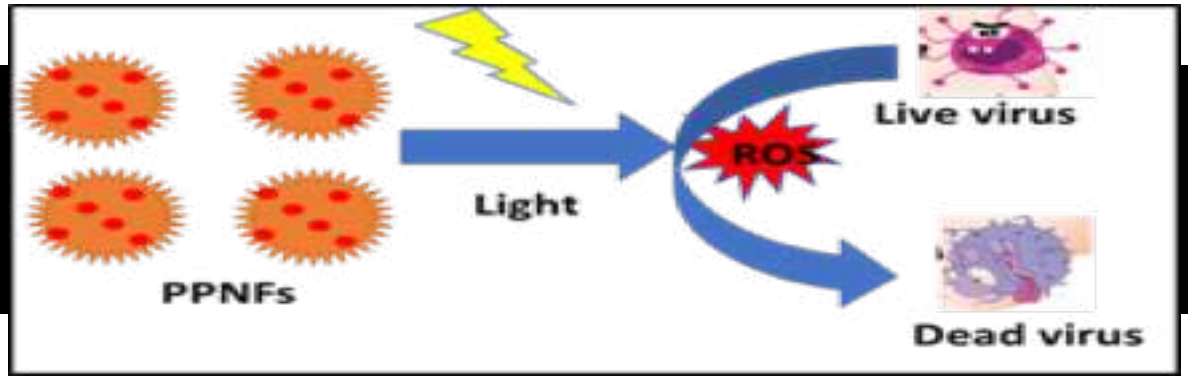


Glucosinolates as anti SARS CoV2 molecules

- Glucosinolate and their hydrolysis products are reported to have activity against influenza viruses, including SARS
- 6 potential glucosinolates (Sinigrin, Glucoraphanin, Glucomoringin, Allyl-ITC, Sulphoraphane, Gluconasturitiin) from Brassica, Moringa and biofortified mustard have been purified

UTILIZATION OF AGRI-BIOMASS FOR THERAPEUTICS BY DBT-CIAB

Polypyrrollic photosensitizers and their nanoformulations for antiviral photodynamic therapy



Preparation of photosensitizer nanoformulations following chemical and photophysical characterization

Determination of the photodynamic antimicrobial efficacy of the in the presence of low cost LEDs

In vitro assay (determination of antiviral efficacy) of the PSNFs against SARS-CoV-2 via light assisted antiviral PDT

Memorandum of Agreement has been signed between DBT-RCB and DBT-CIAB for testing antiviral activity using using SARS-CoV-2

STUDIES ON POTENTIAL OF NATURAL GARLIC ESSENTIAL OIL AS A POTENTIAL INHIBITOR

OF ACE 2 PROTEIN AND THE MAIN PROTEASE PDB6LU7 OF SARS-COV2

Extraction of garlic essential oil from garlic cloves

Detection and quantification of volatiles in garlic essential oil

In vitro assay of garlic essential oil against ACE 2 protein and the main protease PDB6LU7 of SARS-CoV2

Peeled Garlic Cloves ***(1.0Kg)***

Hydro-distillation

Solid-liquid 1:2 w/v
80-90°C , 1.5 h

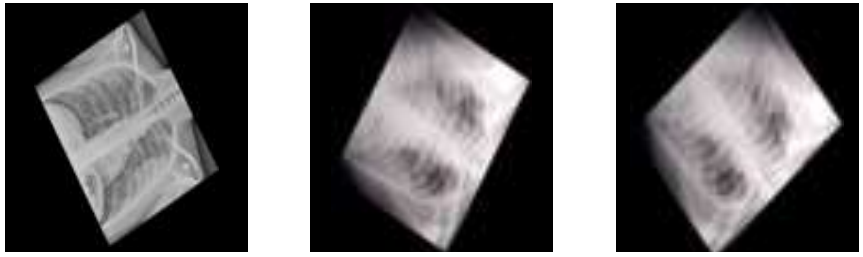
Extraction of Garlic Essential Oil

Garlic Essential Oil ***(1.3 g)***

ARTIFICIAL-INTELLIGENCE BASED CLASSIFICATION OF CHEST X-RAY IMAGES INTO COVID-19 AND OTHER DISEASES – DBT-ICGEB

Chest X-ray Images:
Normal, COVID-19, non-COVID-19, pneumonia, TB

Augmentations



Training Datasets

Training Dataset (90%)

Internal Validation Dataset (10%)

Internal Validation Dataset

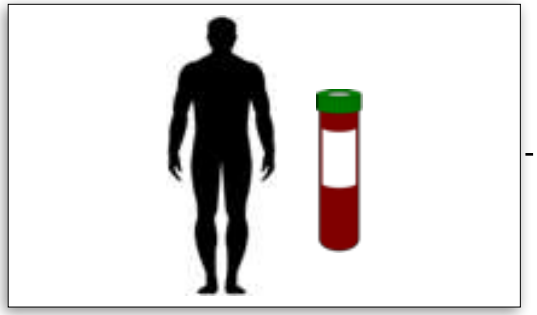
Artificial Intelligence Model Training

Model Selection

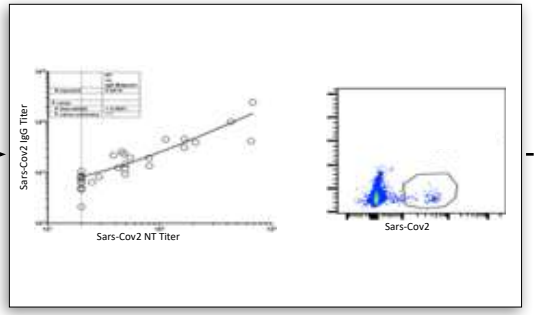
HUMAN MONOCLONAL ANTIBODIES
AGAINST COVID-19

DBT-ICGEB, NIMR-ICMR and Emory University (USA)

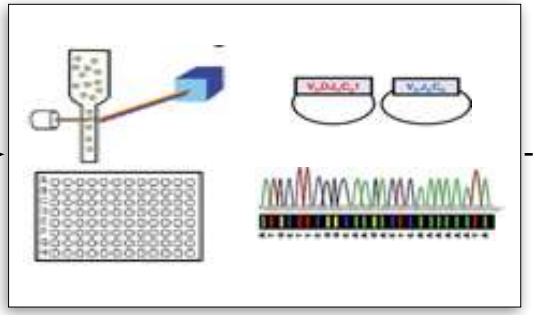
- Successfully generated panels of human monoclonal antibodies from memory B cells derived from Covid-19 recovered individuals from India.
- The monoclonal antibodies show neutralizing effect and are being further characterized functionally & structurally.



Covid-19 recovered individuals recruited by ICMR-NIMR
6 – 8 weeks post SARS-CoV2 PCR diagnosis

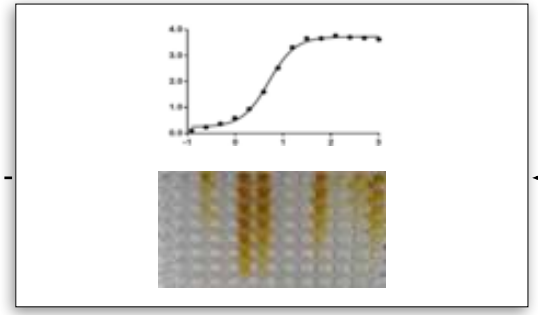


Identification of individuals with high SARS-CoV2 specific IgG titers,neutralizing antibodies and memory B cells.

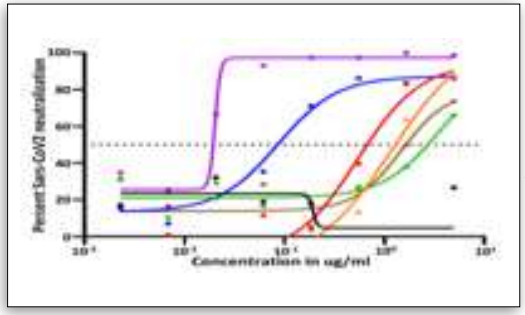


Single cell sorting, cloning & sequencing of SARS-CoV2 specific monoclonals

Expression and purification of SARS-CoV2 specific human monoclonals from expi 293 cells



Screening for SARS-CoV2 specific human monoclonals



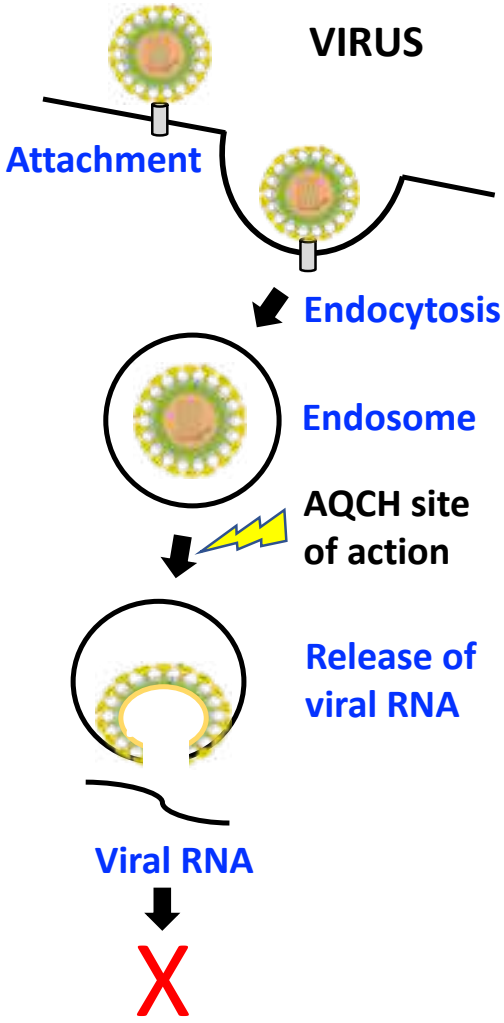
Screening for SARS-CoV2 specific neutralizing human monoclonals

COVID-19 PHYTOPHARMACEUTICAL DRUG CANDIDATE:

ANTI-DENGUE DRUG AQCH COULD WORK FOR TREATMENT OF COVID-19

DBT-ICGEB, Sun Pharmaceuticals, IIIM-CSIR

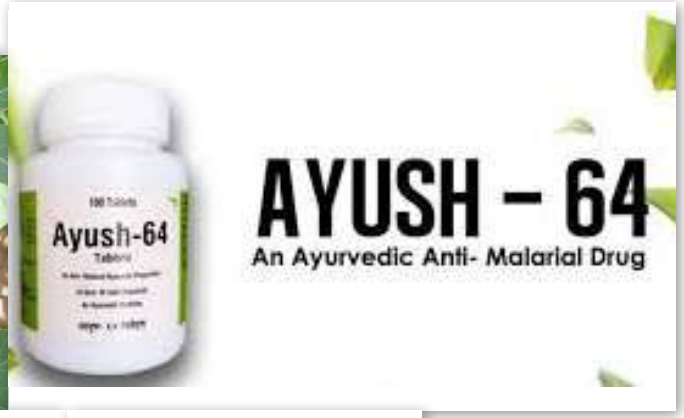
- In vitro mode of action of AQCH against Dengue suggested that it interferes with the endosomal release of the viral RNA.
- Since all +strand RNA viruses use the similar endolysosomal pathway for the release of their genetic material, this drug candidate had a strong case for testing its efficacy against novel COVID-19.
- Anti-COVID-19 activity of AQCH was confirmed against COVID-19 at ICGEB, Trieste through In vitro studies.
- Human safety studies of AQCH completed and phase II clinical trials for anti-COVID-19 treatment is in progress.



DBT-MINISTRY OF AYUSH INITIATIVE ON SARS-COV-2 VIRUS AND COVID-19 DISEASE

A joint DBT-AYUSH action plan formulated and implemented

About 50 plants known in traditional system of medicine in tribal areas of Odisha to be screened



Network programme launched involving four DBT's institutions along with NMPB and CCRAS of Ministry of AYUSH

Fifteen medicinal plants along with eight traditional Ayurvedic formulations shortlisted

Initiated screening of selected medicinal plants and traditional Ayurvedic formulations focusing on in vitro tests against SARS-CoV-2 along with testing immuno-pharmacological, toxicological and drug interaction studies

EVALUATION OF TRADITIONAL KNOWLEDGE-BASED

MEDICINAL PLANTS FOR

SARS-COV2 VIRUS

PHYLLANTHUS FRATERNUS

CASSIA ANGUSTIFOLIA

CENTELLA ASIATICA

CELASTRUS PANICULATUS

HYDROPHILE AURICULATE

ELEPHANTOPUS SCABER

24 plant species traditionally known for anti viral activities collected from Similipal Biosphere Reserve and Gandhamardhan Hills.

High content and High throughput screening initiated with variou solvent extracts.

Aim to identify bioactive fractions with capability to restrict growth of SARS-CoV2 virus.

Assessing bioactive fractions/compositions with capability to induce immunity to be used as prophylactic composition against SARS-CoV2.

CLINICAL TRIALS OF AQCH FOR TREATMENT OF COVID-19 PATIENTS

- Repurposing of anti-dengue botanical drug (AQCH) for COVID-19 (developed jointly by ICGEB, CSIR-IIIM and Sun Pharma)
- AQCH has shown anti-SARS-CoV-2 activity in in-vitro studies
- Human safety studies of AQCH completed and drug has been found safe at the recommended dose for Phase II clinical trials
- First phytopharmaceutical drug approved by DCGI for Phase II clinical trial for COVID-19
- Clinical trials in progress across 10 centres in India covering 200 patients.

DBT- RGCB SCIENTISTS DEVELOPED TWO VERSIONS OF SARS COV2 PSEUDOVIRION ASSAY

Being used for the testing of

anti Covid solutions

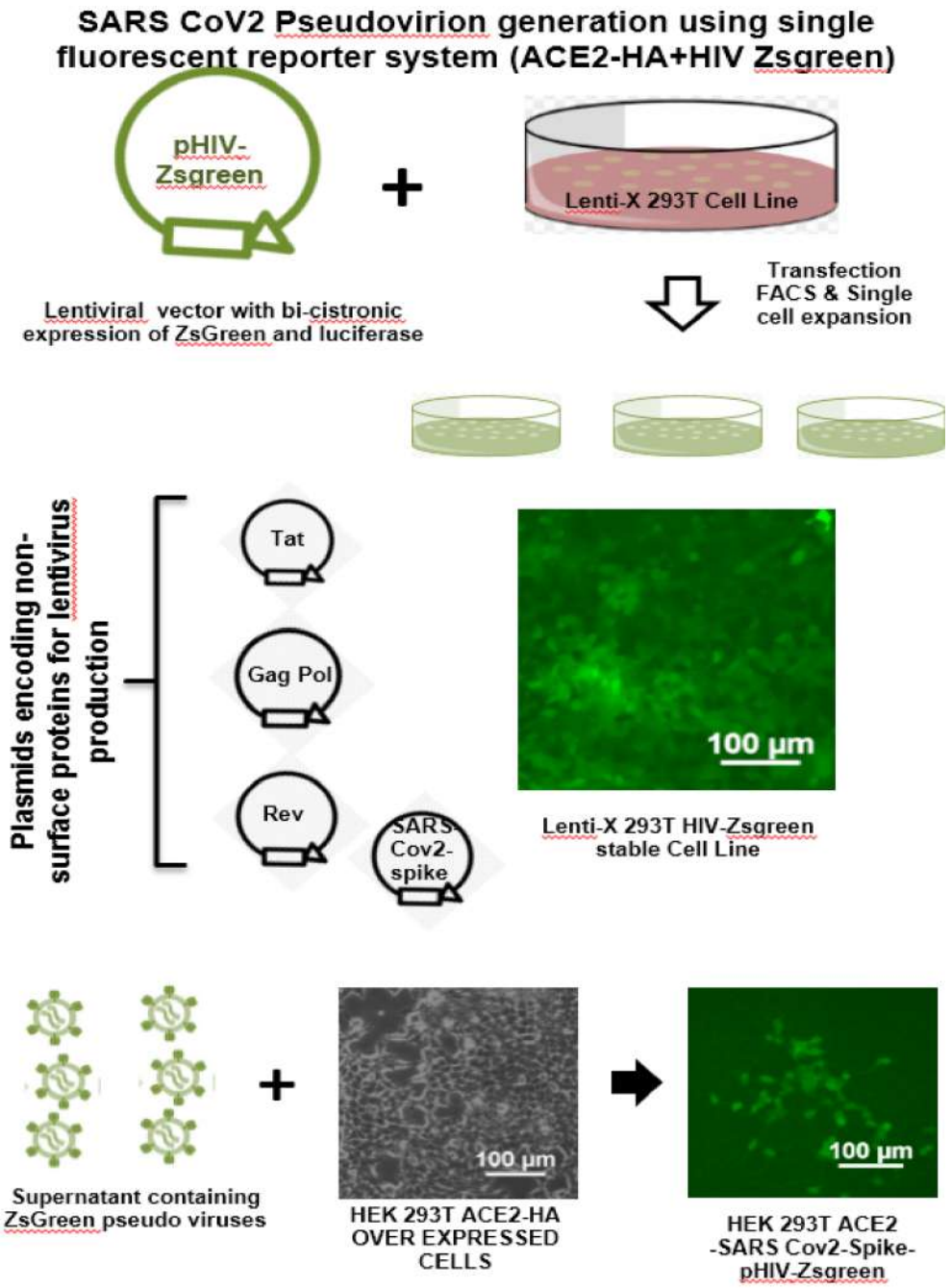
from industry and Academia

More than

200 *samples*

tested

CURRENTLY BEING USED FOR THE VALDIATION OF PRODUCTS FROM ALL OVER INDIA

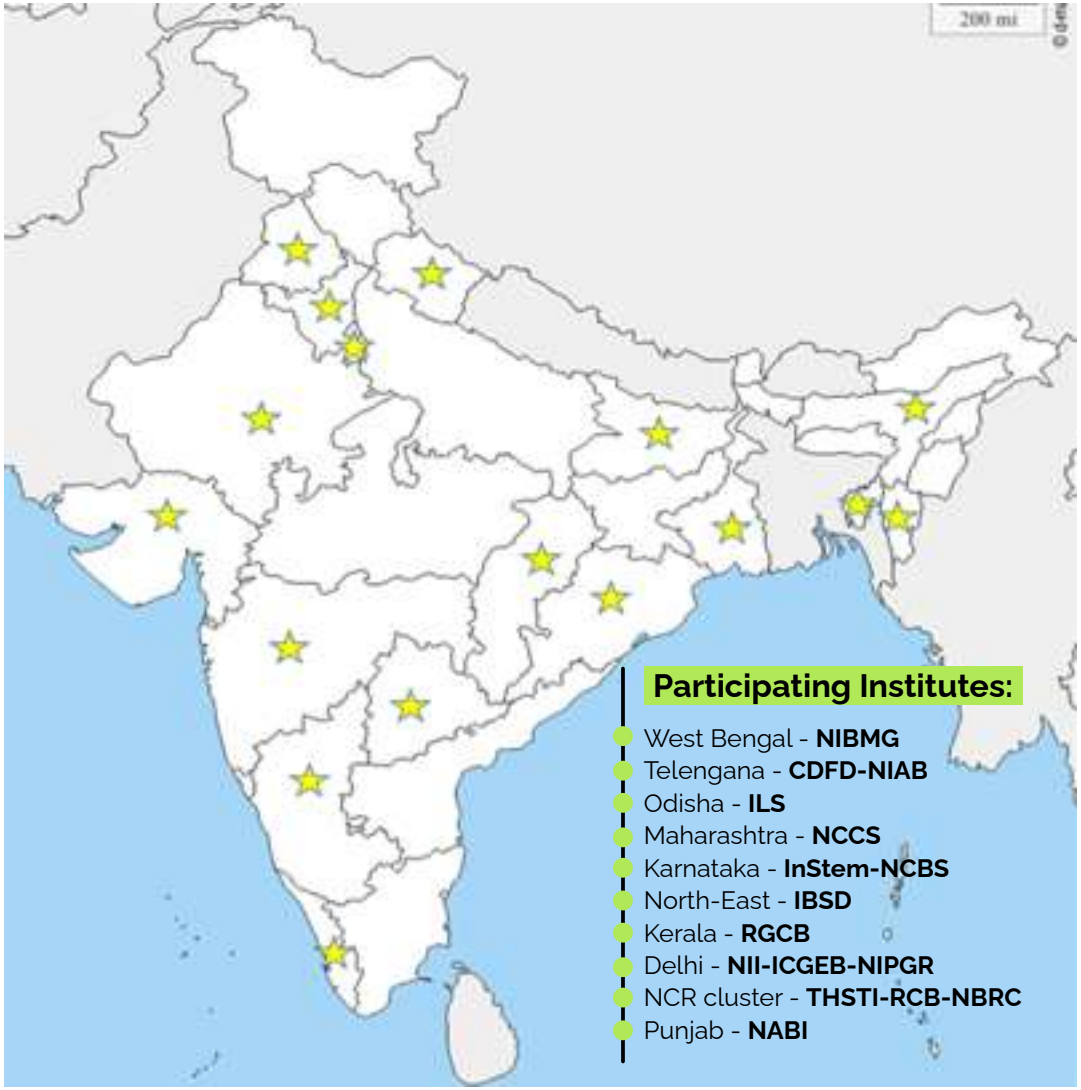


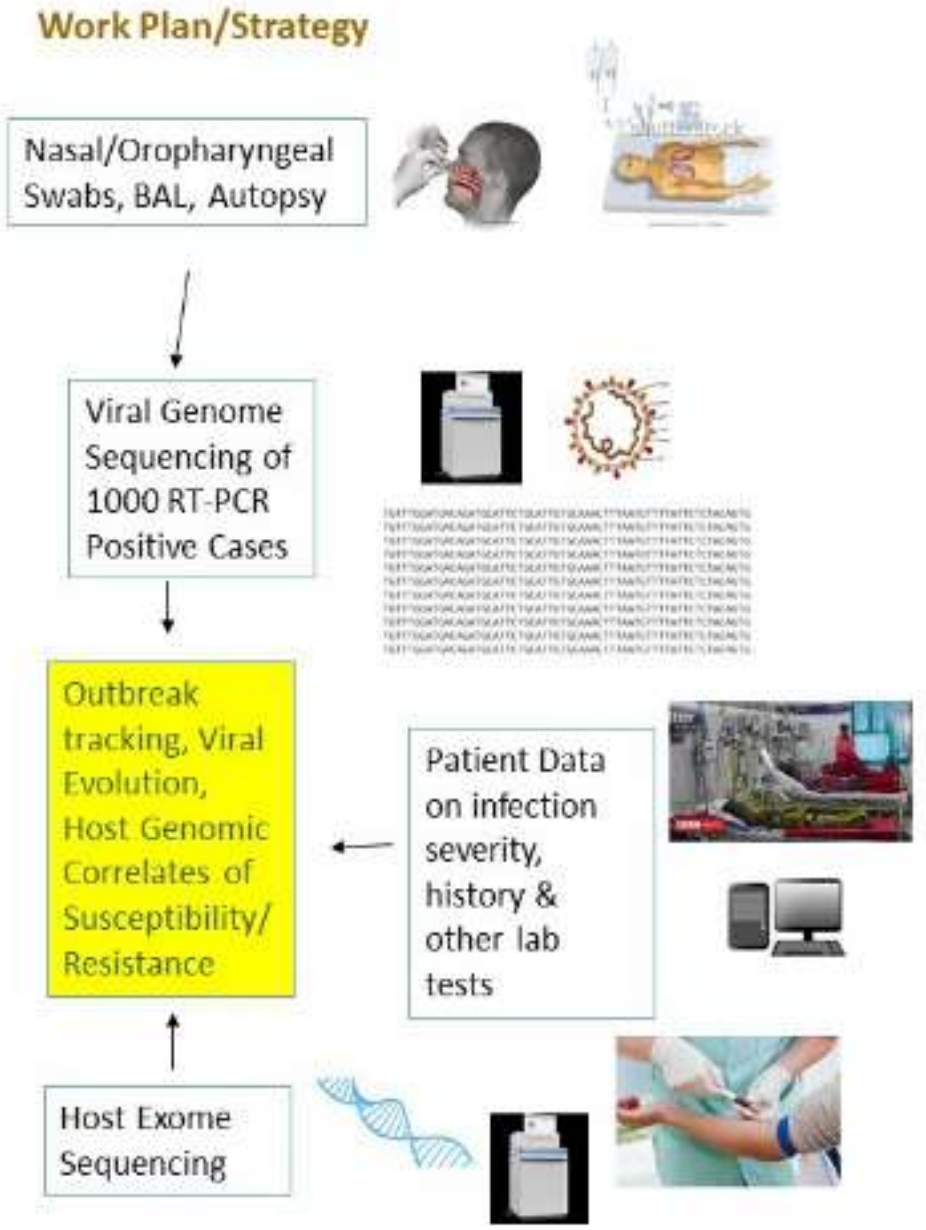
GENOME ANALYSIS OF SARS-COV 2

- Coordinated by National Institute of Biomedical Genomics (NIBMG-Kalyani), West Bengal. Four other National clusters, ILS-Bhubaneswar, CDFD- Hyderabad, InStem-NCBS, Bangalore and NCCS-Pune have actively participated in sequencing and analysis.

- Other collaborating National Institutes and clinical organizations involved are ICMR-NICED, IPGMER-Kolkata, IISc-Bangalore, AIIMS-Uttarakhand, MAMC-Delhi, THSTI-Faridabad, GMC-Aurangabad, MGIMS-Wardha, RMRC-Bhubaneswar, AFMC and BJMC-Pune and other hospitals.

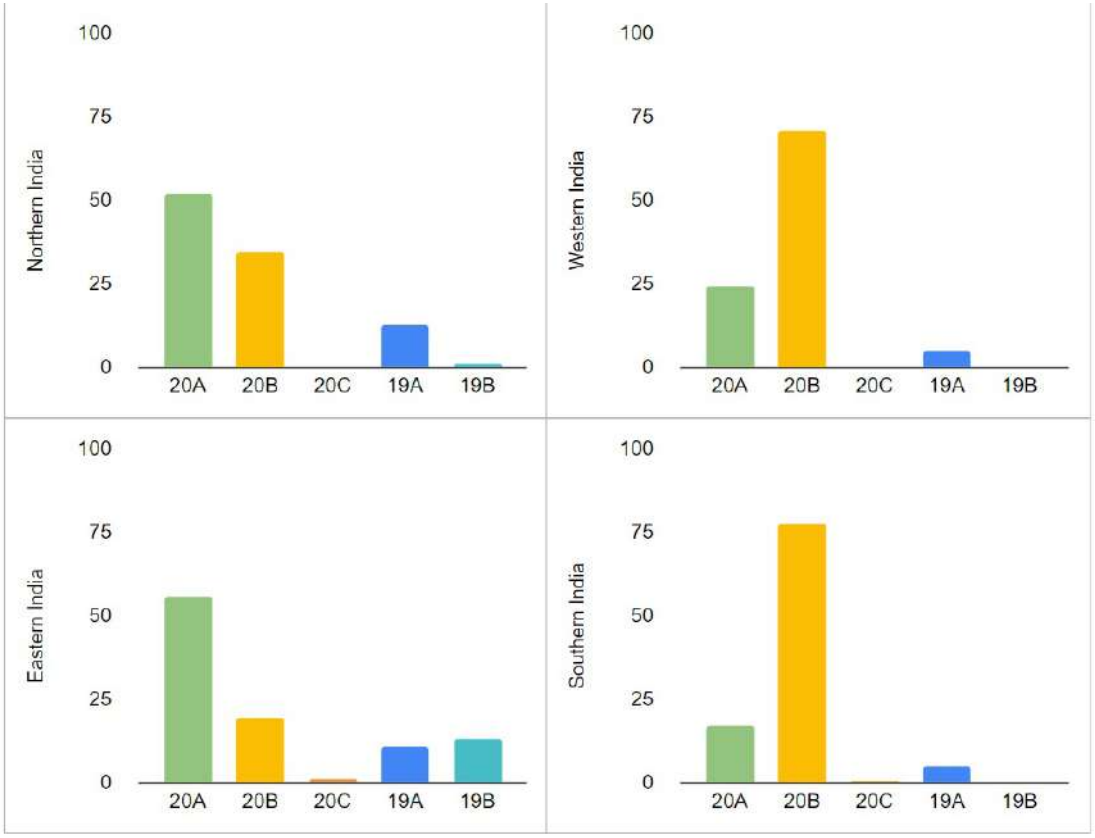
PAN INDIA 1000
SARS-COV-2 RNA
GENOME SEQUENCING CONSORTIUM





HAPLOTYPE DISTRIBUTION:
REGION WISE

- Within haplotypes different states appear to have different proportions.
- East and North are similar. West and South are similar.

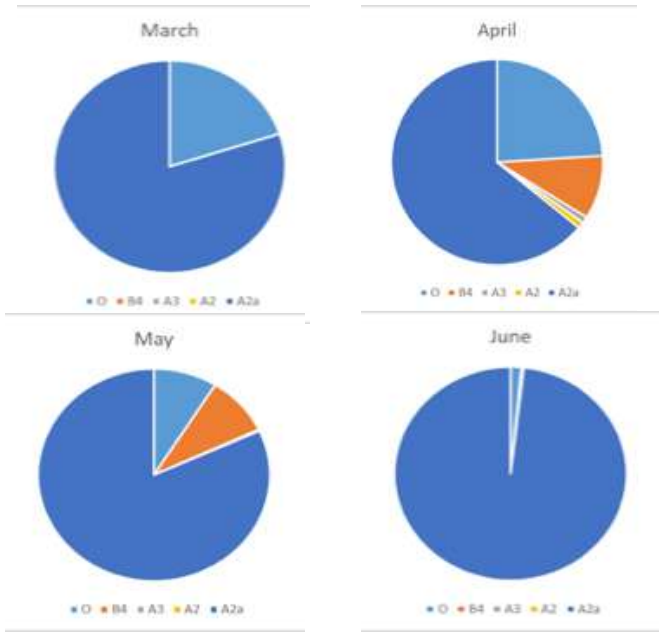


TEMPORAL CLADE DIVERSITIES:

PAN INDIA

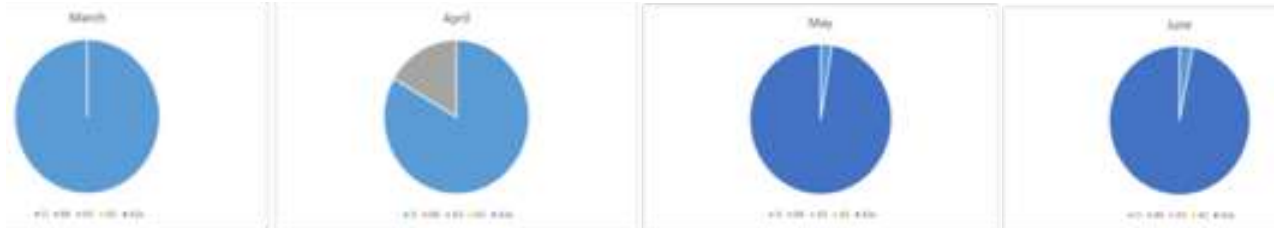
- Haplotype diversities peaked between March-May, early part of the outbreak.
- By June A2a (20A/B/C) emerged as predominant haplotype
- The temporal haplotype diversities landscape appears to be similar PAN India

Pan India

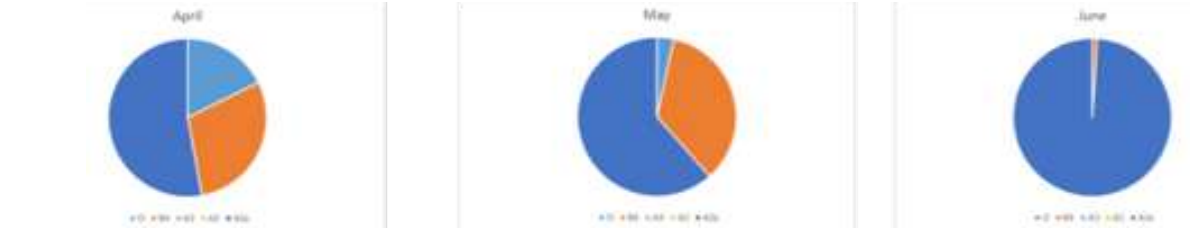


East (West Bengal & Odisha)

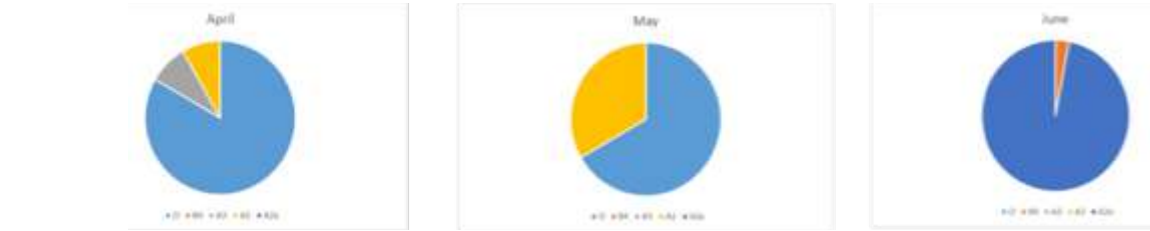
South (Karnataka & Telangana)



West (Maharashtra)

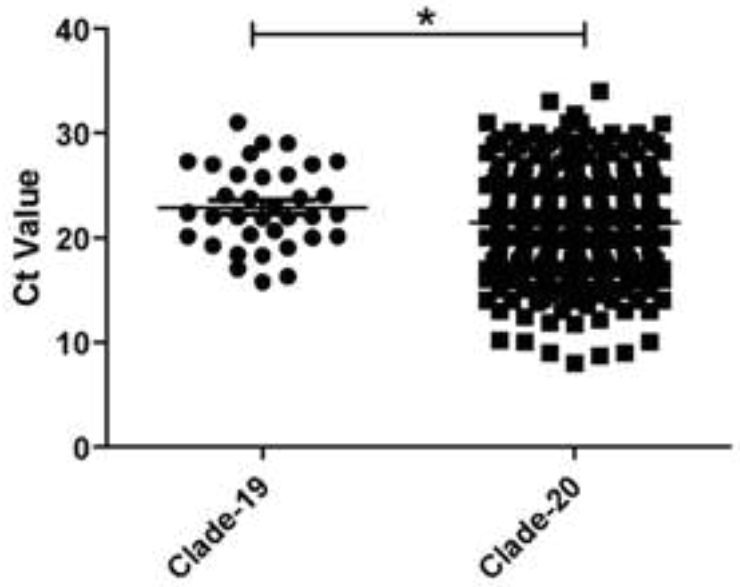


North (Uttarakhand, Haryana & Delhi)



ASSOCIATION OF HIGH VIRAL LOAD WITH A2A (CLADE 20)

Marginally significant association of sequences belonging to 20A, 20B and 20C with lower Ct values of diagnostic Real Time PCR assay compared to those belonging to 19A and 19B



HIGHLIGHTS

- The Consortium has achieved its initial goal of **completing the sequencing of 1000 SARS-CoV-2 genomes** with samples **across 10 states covering different zones** within India. The sequence data will soon be released in public domain (GISAID database).

- Initial results indicate that **multiple lineages of SARS-CoV-2 are circulating in India,** probably introduced by travel from Europe, USA and East Asia. In particular, there is a **predominance of the A2a haplotype (20A/B/C) with D614G mutation**, which is globally reported to be associated with enhanced transmission efficiency.

Future Directions:

Study the implications of mutations in Virus **Entry, Immunogenicity** and **Pathogenesis** using **VLP model**

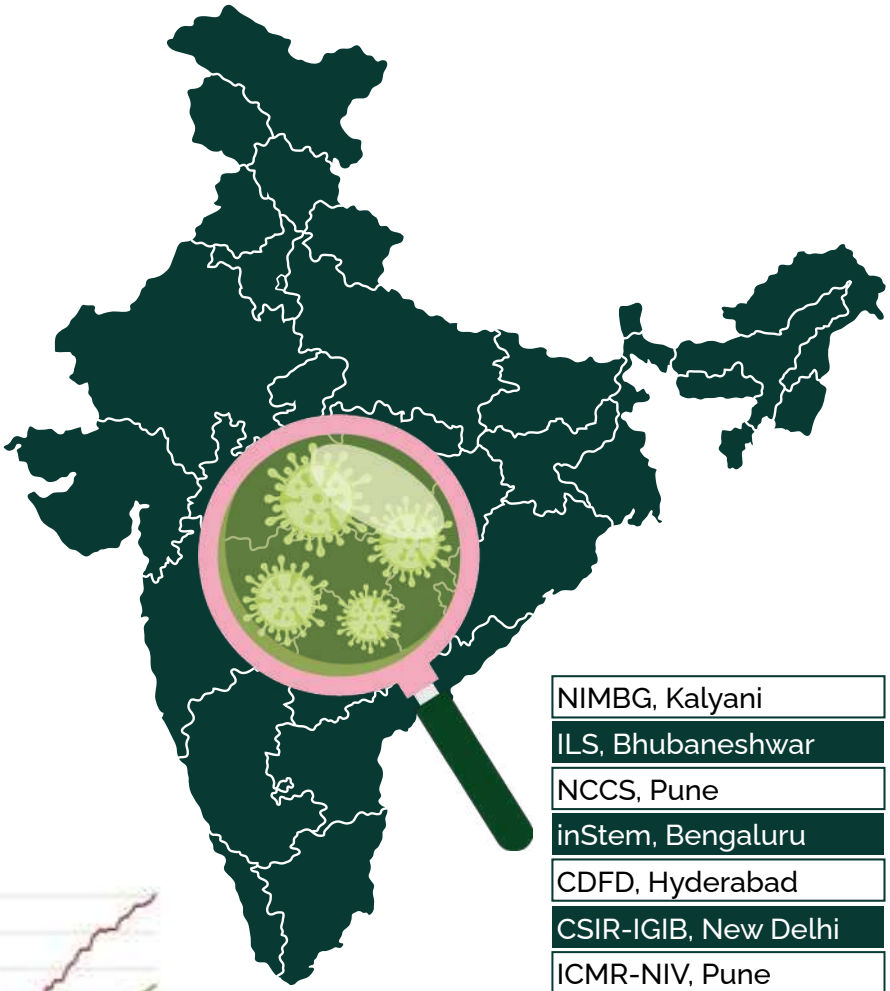
Identify **host genetic polymorphisms** that either **confers susceptibility or protection** from the viral infections.

Investigate the **Viral and Host genetic determinants** of disease severity

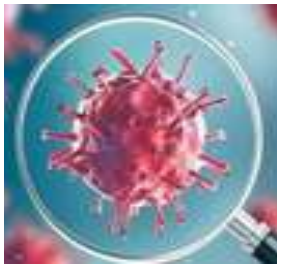
INSACOG: INDIAN SARS-COV-2 GENOMICS CONSORTIUM

Ministry of Health and Family Welfare, Government of India
Department of Biotechnology
ICMR Indian Council of Medical Research

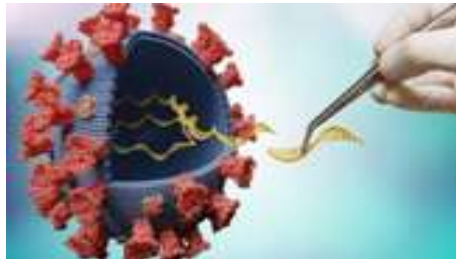
- **Ascertain Status of new variants of concern of SARS-CoV-2 (SARS-CoV-2** VUI 202012/01) in the country
- To **establish a sentinel surveillance for early detection** of genomic variants with public health implication
- To **determine the genomic variants in the unusual events/trends** (super-spreader events, high mortality/ morbidity trend areas etc.)



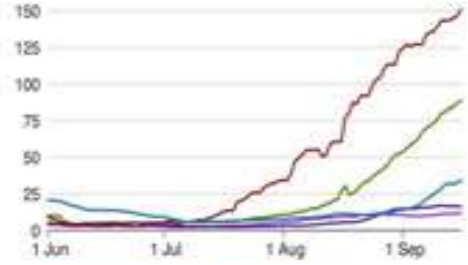
- NIMBG, Kalyani
- ILS, Bhubaneshwar
- NCCS, Pune
- inStem, Bengaluru
- CDFD, Hyderabad
- CSIR-IGIB, New Delhi
- ICMR-NIV, Pune
- NIMHANS, Bengaluru
- CSIR,CCMB, Hyderabad
- NCDC, New Delhi



Status of the new variant



Detection of genomic variants with health implications

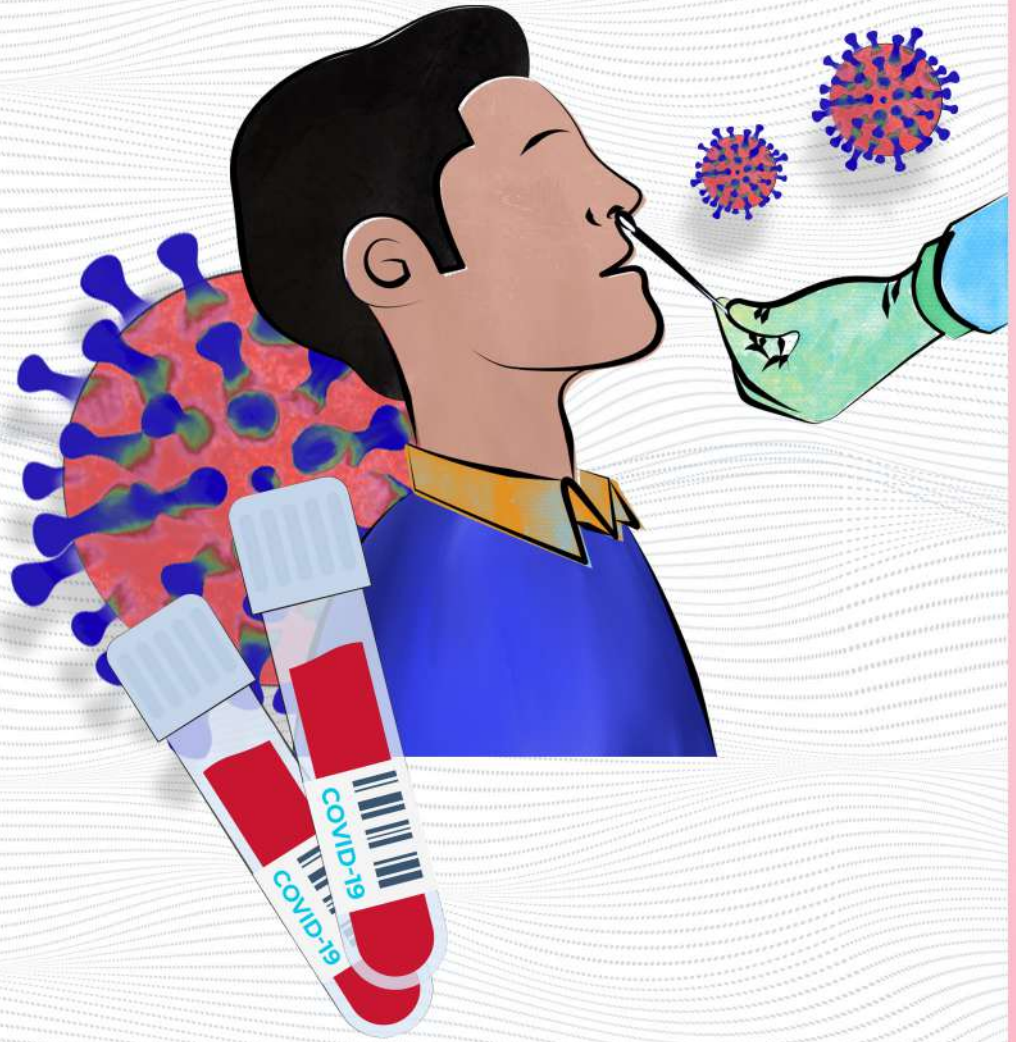


Identify variants in unusual events/trends

COVID-19

The Virus

Other Interventions



COVID-19

Diagnostic Testing and Drug Screening

GERMICIDAL CHEMICAL THAT CAN BE "COATED" ON FABRIC

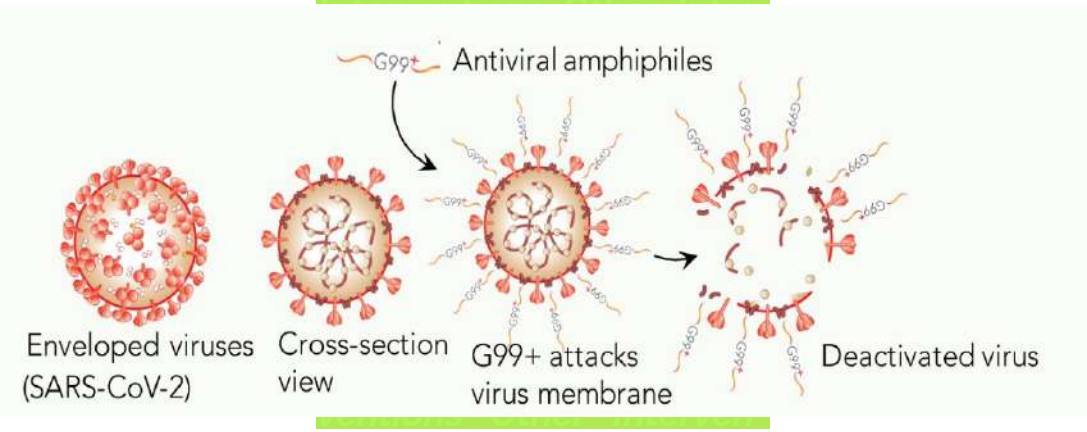
TECHNOLOGY TRANSLATED COMMERCIALLY

Re-usable:

Can be used for 90 days
with 30 wash cycles

- Antibacterial
- Antiviral
- High Breathability
- High Bacterial Filtration Efficiency
- High Particle Filtration Efficiency
- Fluid Splash Resistant

Tested at:
The South India Textile Research Association (SITRA) Coimbatore



Effective against:

SARS-CoV-2 pseudovirus
Gram negative bacteria
Gram positive bacteria
Multiple enveloped viruses

DISTRIBUTION OF SANITIZERS, MASKS, PPE KITS, ETC.

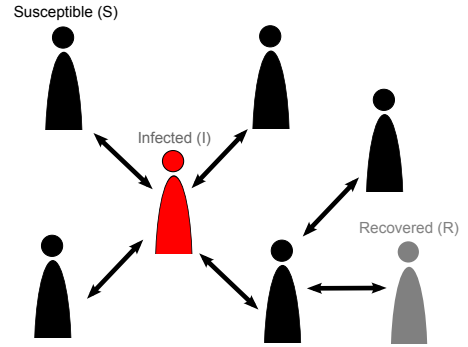
BY IBSD

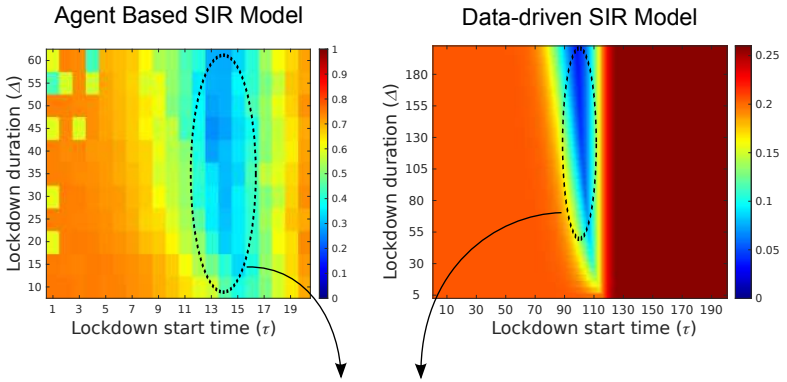
- DBT-IBSD Imphal, Manipur ; Gangtok, Sikkim ; Aizawl, Mizoram and Shillong, Meghalaya distributed masks and sanitizers to different frontline workers on a weekly basis.
- Vulnerable sections of society such vegetable vendors, farmers, taxi drivers, senior citizens and orphans were the other target groups for distribution of masks and sanitizers.

DBT-NBRC : OPTIMAL LOCKDOWN STRATEGIES

FOR ARRESTING COVID-19 SPREAD

- Well-timed lockdowns can significantly alter disease dynamics and prevent the maximum number of active cases from breaching the hospitalization threshold, i.e. the capacity of the available healthcare facilities.
- Computations models can be a powerful tool to suggest lockdown windows for maximal effectiveness for arrest of COVID-19 spread while minimizing strain on the available healthcare infrastructure.





OTHER INTERVENTIONS
BY DBT-RGCB

ACE2 HA Stable cells for SARS CoV2 Research

DBT- RGCB developed the following cell lines and validated their utility using pseuodvirion assay and fluorescent RBD & S1 protein

- HEK293 Stably expressing human ACE2 HA
- HEK 293 stably expressing human ACE2 – myc
- DLD cells stably expressing h ACE2

Cell resources developed by DBT-RGCB for research community

- DLD stable cells expressing human ACE2- EGFP
- DLD stable cells expressing human ACE2 –Cereulean
- DLD stable cells expressing SARS CoV2- RBD EYFP
- HEK 293 stable cells expressing human ACE2 EGFP
- HEK 293 stable cells expressing human ACE2 –Cereulean
- HEK 293 stable cells expressing SARS CoV2- RBD EYFP

A SARS CoV2 Permissive Cell line expressing human ACE2

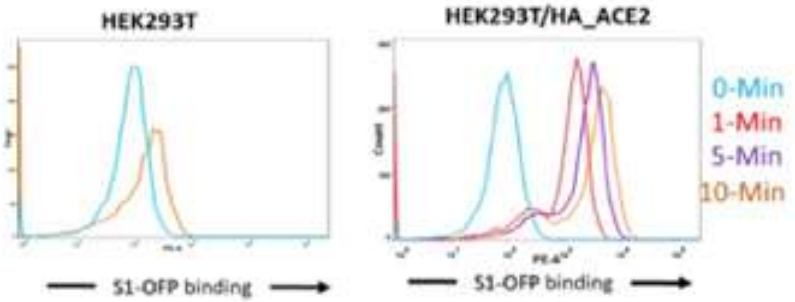


Figure 3, Flow cytometry analysis of SARS COV2-S1-OFP binding to HEK293T/HA_ACE2 cell line

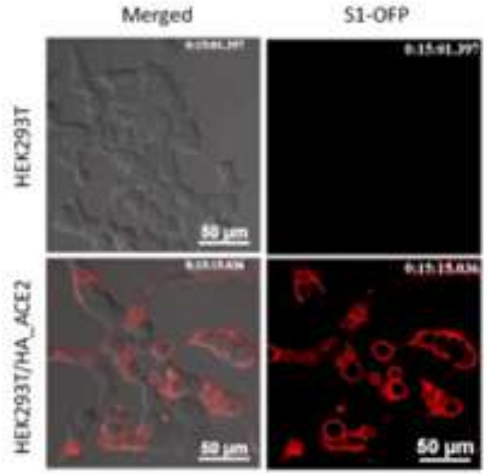


Figure 4, Real-time imaging of SARS COV2-S1-OFP binding to HEK293T/HA_ACE2 cell line

The cell line validated for pseudovirion assay and Viral propagation is available from Layog Life Sciences, a biotech incubator compnay at bio-nest

COVID-19

Capacity Building and Outreach

TRAINING PROGRAM TO STRENGTHEN THE CLINICAL TRIAL RESEARCH CAPACITYIN NEIGHBORING COUNTRIES

'Training Program to Strengthen the Clinical Trial Research Capacity in Neighboring Countries' initiated on 22nd Sept and various modules are planned for next 02 months.

- Afghanistan
- Bhutan
- Bangladesh
- Maldives
- Marutius
- Nepal
- Sri Lanka

DBT India and BIRAC, through their Ind-CEPI Mission are committed to capacity building and regional networking for clinical trials.: GCP, Ethics in Clinical Research, GCLP and Vaccine trials in population

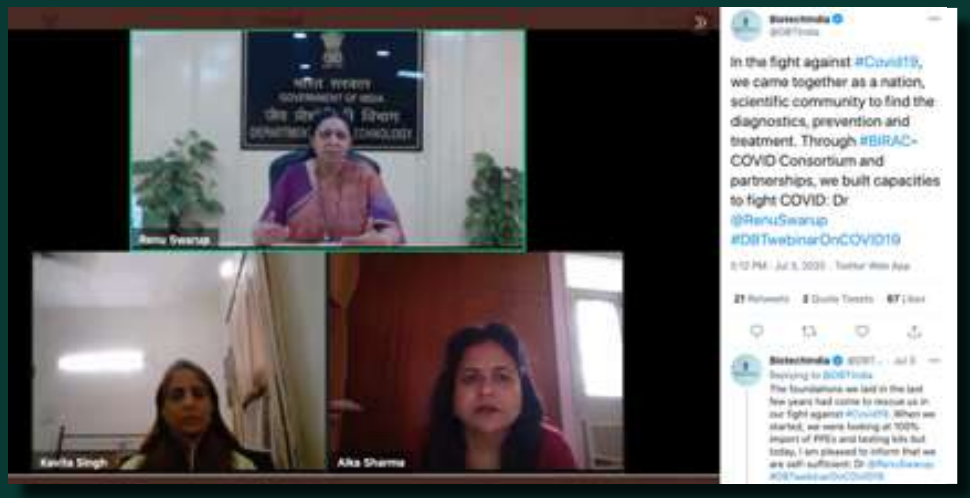
A MACHINE LEARNING APPLICATION FOR RAISING WASH AWARENESS DURING PANDEMIC

DBT/Wellcome Trust India Alliance fellow Dr Tavpritesh Sethi at IIIT New Delhi and his team has developed android based app “Wash Karo” that functions as a complete Infodemic Management Suite. It was presented at WHO, Geneva on April 8, via video conferencing.

Wash Karo aims to provide the right information to the right people in the right format at the right time.

DBT'S WEBINARS ON COVID

DBT organized a six-part webinar to highlights the response of DBT,its AIs, PSUs and the start up community in the development of diagnostics, vaccines, monoclonals, novel protection equipment. The panelists included Dr Renu Swarup, and senior leadership from BIRAC, C-CAMP, AMTZ and AIs at the forefront of the COVID-19 response. The series received over 7300 registrations, participation of 3300+ in addition to approx. 4500 views on the social media.



ASK THE EXPERT SERIES

To contain the spread of misinformation and fear on COVID-19, THSTI and India Alliance partnered with IAVI and Nature India to organize a series of 8 webinars in which experts answered questions about COVID-19. The webinar was an opportunity for media professionals and those seeking credible information on the pandemic to interact with experts to better understand COVID-19's science and public health impact, as well as best practices and tools of fact-checking and reporting. These webinars were attended by over 2000 people.

DBT ORGANISED WEBINARS ON THE SCIENCE OF COVID-19 VACCINE DEVELOPMENT, PRODUCTION AND IMPLEMENTATION

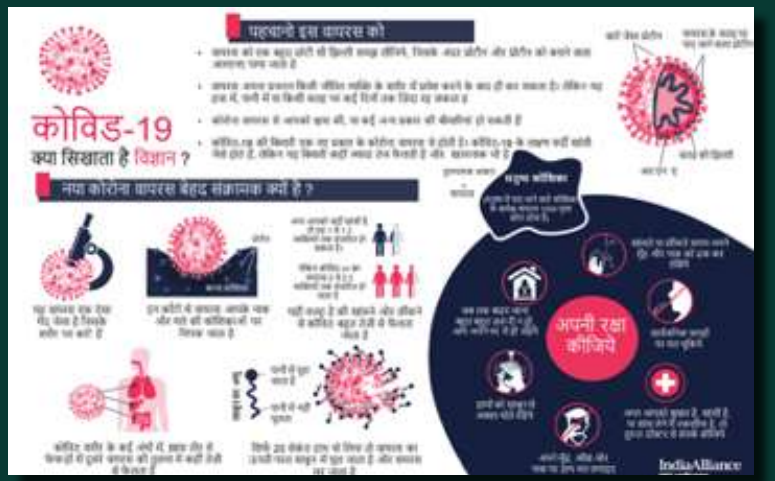
DBT organised two webinars on key elements of COVID-19 vaccine development, production and implementation. These webinars witnessed participation from policymakers, regulators, scientists, vaccine manufacturers and public health experts.

BEHAVIOR CHANGE COMMUNICATION

In response to Hon'ble PM's Jan Andolan on COVID-19, DBT, AIs and PSUs undertook pledge, placed hoardings at various places and ran a social media campaign towards behavioral change.

INFOGRAPHICS

India Alliance developed 5 COVID-19 infographics. Beyond English, these have also been translated into over 12 Indian languages, and distributed widely including government departments.

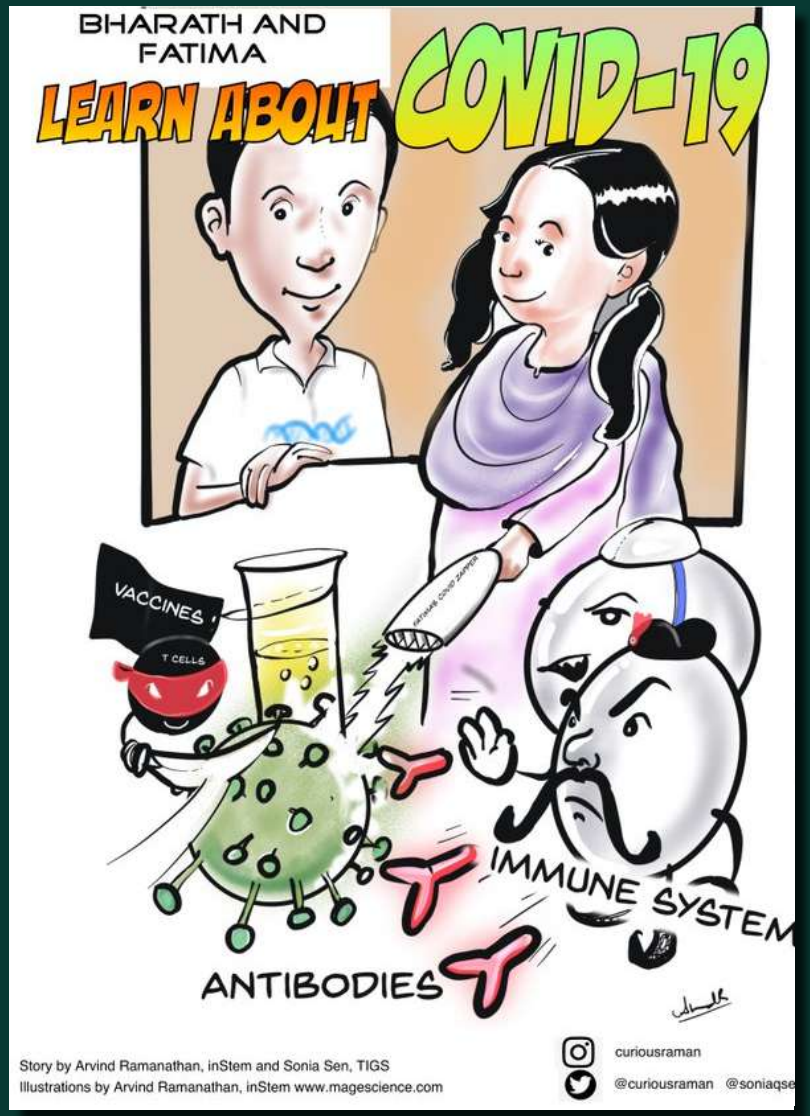


COMICS

THSTI published comics in English, Hindi and Punjabi to busts some COVID-19 myths on the spread and prevention of COVID-19

GRAPHIC NOVEL

InStem published a graphic novel in English Marathi, Hindi, Kannada to spread awareness about the COVID-19 is to create awareness in non-specialist readers, especially children, about the current health crisis.



PLANET DIVOC-91

A COVID-19 inspired webcomic project

India Alliance partnered with teams in the UK and South Africa on an innovative digital comic for young adults (YA) aged 16-25, Planet DIVOC-91, which would provide an alternative, character-based narrative about a pandemic. The project is a collaborative effort with involvement of scientists and researchers from a wide range of disciplines spanning infectious diseases, behavioural sciences, health economy, health inequalities and more. As well as being an opportunity for young people to respond to the science and research, the project aims to influence future decision making and policy.

PODCAST

India Alliance supported a 3-D podcast series, “Scrolls and leaves”, that explores the history of science and medicine and its interplay with trade and geopolitics to help us make sense of the current pandemic.

Department of Biotechnology
Government of India

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