

# SCIENCE & TECHNOLOGY EFFORTS IN INDIA ON COVID-19

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Compiled by  
**VIGYAN PRASAR**  
An Autonomous Organisation of  
Department of Science & Technology,  
Government of India



सत्यमेव जयते  
**FOREWORD**

## डॉ हर्ष वर्धन Dr Harsh Vardhan

स्वास्थ्य एवं परिवार कल्याण, विज्ञान और प्रौद्योगिकी  
व पृथ्वी विज्ञान मंत्री, भारत सरकार

Union Minister for Health & Family Welfare,  
Science & Technology and Earth Sciences  
Government of India

सबका साथ, सबका विकास, सबका विश्वास  
Sabka Saath, Sabka Vikas, Sabka Vishwas

The 2019 Novel Coronavirus (SARS-CoV-2) has spread rapidly throughout the world and has assumed the proportion of a Pandemic. Given the lack of an efficacious vaccine as well as non-availability of suitable chemotherapeutic interventions, mankind is experiencing an unprecedented existential crisis.

2. The Ministry of Science and Technology and the Ministry of Health & Family Welfare, with their various departments, are contributing in various ways towards the national R&D efforts for developing solutions to combat COVID-19. The Department of Science & Technology under the Ministry has launched a nationwide exercise to map and boost development of COVID-19 solutions with R&D, seed capital and scale-up support. All academic and research institutions are being reoriented to focus on the development of diagnostics, vaccines, antivirals, disease models and other R&D to enable a cure for this dreadful disease. Around 15 labs of Council of Scientific & Industrial Research (CSIR), under the Department of Scientific & Industrial Research, across the country are working in close partnership with major private sector Industries, PSUs, MSMEs and other Government departments to develop solutions for COVID-19. The Department of Biotechnology (DBT) under the Ministry has also formed a consortium to support the development of Medical equipment, Diagnostics, Therapeutics, Drugs and Vaccines to meet the Healthcare Challenges. Indian Council of Medical Research (ICMR), under the Ministry of Health & Family Welfare has already isolated the virus strain successfully, which is a first step towards vaccine research. Similarly, various other organizations under Ministry of Human Resource & Development, Ministry of Defence, Ministry of Chemicals & Fertilizers, etc. are also contributing substantively to our R&D efforts. The private sector has also come forward in a big way to supplement these efforts.

3. With a view to spreading awareness about the S&T efforts of the Government of India as well as private sector in finding solutions for COVID-19, Vigyan Prasar - an autonomous institution under Ministry of Science & Technology and engaged in large-scale science communication and popularization activities - has compiled all initiatives being undertaken in this field.

4. This document "Science & Technology Efforts on COVID-19 in India" shall serve as a ready-reckoner for policy makers, scientists, researchers, scholars and other stakeholders who might be interested in understanding and keeping themselves abreast with the latest S&T efforts being made to develop solutions to combat COVID-19.

  
(Dr. Harsh Vardhan)

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# PREFACE

The COVID-19 pandemic is unleashing a human development crisis. On some dimensions of human development, conditions today are equivalent to levels of deprivation. The crisis is hitting hard on all constitutive elements of it: economy, health and education. Most of the current strategies to reduce the risk of SARS-CoV-2 transmission are based on controlling interactions between humans, including case isolation, tracking patient contacts and screening passengers crossing borders. The pandemic has posed one of the biggest challenges to the entire humanity. In the wake of its outbreak, our lives have changed in ways we had never imagined before. We all are adapting to live with coronavirus and adjusting to new normal of several aspects of our day-to-day life, since there is no early tapering off of the disease.

In these critical times, access to authentic information is of paramount importance. Vigyan Prasar (VP) has been covering the pandemic since the early days with the science communication perspective, ensuring that science and safety are the primary focus. For the benefit of the stakeholders and target audience, Vigyan Prasar is preparing and publishing compilation of the most relevant initiatives and efforts taken by the Government of India through its various Science Ministries, Departments, and Funding organizations, in the shape of daily, weekly, and now fortnightly e-Newsletter. These research-driven and technology-based interventions have been initiated on war footing to fight out the outburst of the pandemic. Government of India, through its various wings, has invited Calls for Proposals (CFPs) and Expressions of Interest (EoIs), announced various hackathons and challenges and reached out to general public through various apps, pledges, etc. to enhance research and development-related activities to battle the pandemic out as well as making the nation aware and self-reliant.

The pandemic was superimposed on unresolved tensions between people and technology, between people and the planet, between the haves and the have-nots. These tensions were already shaping a new dimension of inequalities pertaining to enhanced capabilities and the new necessities of the 21<sup>st</sup> century. But the response to the crisis carries the potential to shape strategies on how those tensions can be addressed and how inequalities in human development are reduced. We hope this initiative of Vigyan Prasar shall be a handy guide to scientists, researchers and scholars, especially those who are interested in knowing various aspects of COVID-19 and contributing to the coronavirus warfare and making the nation Atmanirbhar. Atmanirbhar Bharat, the vision of New India, will be fulfilled with aggressive implementation of the Make in India initiatives and when we would be wholeheartedly 'Vocal for Local'.

Vigyan Prasar  
New Delhi

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The e-newsletter is being published on a regular basis by collating all the inputs received till the preceding day of the release.

The older issues of e-newsletter are available in the Archival Section at <https://vigyanprasar.gov.in/covid19-newsletters/>

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## SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

# DEPARTMENT OF SCIENCE AND TECHNOLOGY (DST)

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### **New age sustainable disinfectants and sanitizers may bring relief from chemical ones with side effects**

The days of suffering from dry, itching hands due to rinsing them multiple times with chemical disinfectants and soap as protection against contact infection of COVID-19 may soon be over. A number of start-ups based in different parts of India are now armed with a range of sustainable alternatives to conventional chemical-based decontaminants that can disinfect surfaces and even microcavities.

Safe disinfection and sanitization technologies have come from a total of 10 companies supported for disinfectants and sanitizers under Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH), an initiative by the National Science & Technology Entrepreneurship Development Board (NSTEDB), DST and implemented by Society for Innovation and Entrepreneurship (SINE), IIT Bombay.

Mumbai-based start-up Inphlox Water Systems, with expertise in treating complex polluted water and wastewater, modified their technology to design and develop a system for space and equipment disinfection to fight COVID-19 contamination, titled VAJRA.

Inphlox Water Systems, which started with the Nidhi Prayas grant from DST (through IIT Bombay) for innovations in the water sector, used the CAWACH grant from DST to modify their technology to make it suitable for combating the COVID-19 infection.

At present, they are coordinating with IIT Bombay's and CCMB's (Hyderabad) virology labs for further testing of these systems. The start-up is ready with commercial product versions and is working on improving product certifications so that specialized labs can also use their solutions.

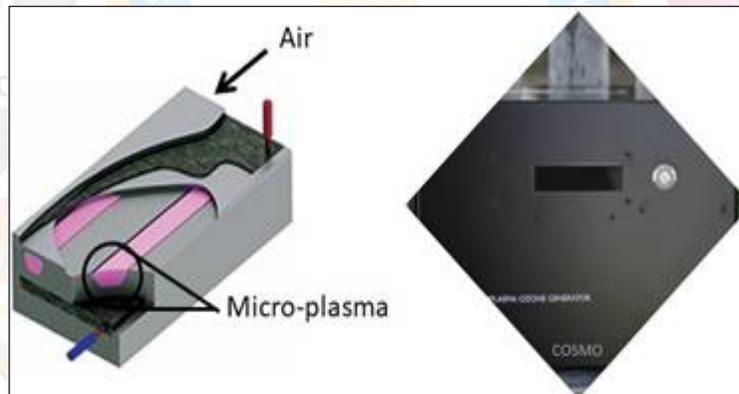
Coimbatore-based Eta Purification offers advanced sterilization solutions. It is using environmentally-sound micro-cavity plasma technology. This novel technology, where the disinfectant is produced directly from air or oxygen offers a sustainable alternative to conventional chemical-based decontamination.



The COSMO (Complete Sterilization by Microplasma Oxidation) system can rapidly disinfect COVID-19 infected areas, including quarantine facilities, ambulatory care, and equipment surfaces. This innovative micro-plasma sterilization system offers compact and scalable modular units which are robust, flexible, and energy-efficient.

The disinfectant is produced on-site, thereby eliminating the transport, storage, and handling of hazardous chemicals. These decontamination systems are 10 times less than the conventional system of equivalent capacity, making it suitable for resource-constrained environments.

They have also taken this innovation to vulnerable communities. Presently their advanced integrated micro-plasma oxidation system for rapid sterilization has been fully developed and tested rigorously for commercial use.



A mechanical hand sanitizing dispenser machine which quantifies the steps of hand sanitization through touch-less, real-time monitoring via dashboard is offered by Chennai-based start-up MicroGO.

Pune-based Weinnovate Biosolutions has developed silver nanoparticles based on non-alcoholic liquid sanitizer. Their technology, pending for patent, also inhibits the RNA replication activity – preventing spread of the virus and blocks surface glycoproteins – making the virus ineffective.

An instant microwave-based handheld steriliser ATULYA and a microwave-assisted cold sterilization device OPTIMASER for hazardous biomedical waste disinfection and making linen and PPE reusable are the offering from Lucknow-based Maser Technology.

OPTIMASER is microwave-assisted cold sterilisation superior technological advancement over the conventional Autoclave. It allows for disinfection and sterilisation of the PPE Kits and the masks in order to ensure their reusability for 100 times. It also makes the system cost effective. ATULYA is an instant microwave-based handheld sterilizer which offers the cutting edge over the UV tube-based steriliser, sanitising sprays and all the possible methods of sterilisation and protection.

Incubators like SINE IIT Bombay FIIT, IIT Delhi, SIIC, IIT Kanpur, HTIC, IIT Madras, Venture Centre, Pune, IKP Knowledge Park, Hyderabad, KIIT-TBI, Bhubaneswar provided timely advice on technical progress, guided the start-ups to follow all necessary guidelines, signing of MoUs and so on.

DST Secretary Prof. Ashutosh Sharma said, “Through these and other compelling examples of COVID-19 relevant products and technologies, the deep foundations of the Indian science and technology have rapidly come to fore by a seamless marriage of the knowledge creation and its consumption. The structures and processes which made these extraordinary achievements possible are being incorporated in the upcoming Science, Technology and Innovation Policy 2020.”

**Website link:**  
<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1667587>



# SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

## DEPARTMENT OF BIOTECHNOLOGY (DBT)

### DBT-IBSD, Shillong distributes surface disinfectant to a school for the poor

With the opening of schools in Meghalaya and with an aim to help in the sanitization of schools, the DBT-Institute of Bioresources and Sustainable Development (DBT-IBSD), Shillong, Meghalaya, distributed the Institute made surface disinfectant to Sein Jaintia Secondary School, Qualapatty, Jeep Stand, Shillong in presence of the Principal, Mrs. V. Shylla and teachers of school. This School caters to the economically weaker section of the society through free education from nursery to class VII.





*Principal, teachers and IBSD staff at Sein Jaintia High School, Shillong*

The DBT-IBSD, under the leadership of the Director, IBSD, Prof. Pulok K. Mukherjee, is actively involved in helping society through distribution of Institute made sanitizer, disinfectant, and face masks to vegetable vendors, traffic police, taxi drivers, bank staff and school teachers to help in fighting the COVID-19 pandemic. In different parts of North East India, IBSD Centres are actively participating and serving society through such outreach activities to fight the COVID-19 pandemic.

Contact Info: Prof Pulok K Mukherjee

**Website link:**

<https://wyrta.com/e-yarap-ka-dbt-ibsd-ya-ka-sein-jaintia-secondary-school/>  
<https://theshillongtimes.com/2020/09/29/dbt-ibsd-provides-disinfectants-to-shillong-school/>  
<https://www.indigenoussherald.com/TripuraNews/dbt-ibsd%E2%80%99s-free-sanitizer-distributi-14149.html>  
<http://ibsd.gov.in/ibsd/home>

## **Scientist develop specialised mouse models to study COVID-19**

Animal models are required to understand the pathogenesis of any virus and its effects on multiple organs in the body and for developing effective treatments and vaccines. Mouse models are the pre-eminent platform for preclinical studies. They provide insights into disease etiology and serve as a platform for vaccine and drug development.

Studies have shown that the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2), the virus that causes COVID-19, enters the human body by binding to an enzyme called human angiotensin-converting enzyme 2 (ACE2). However, due to structural differences between the ACE2 enzymes in mouse and human beings, commonly used wild-type mouse strains are not appropriate for studying infections of coronavirus.

The Mouse Genome Engineering Facility (MGEF) at the Bangalore Life Science Cluster (BLiSC) has designed three different sets of ACE2 mouse models to overcome the problem, leveraging its expertise and infrastructure established with support from the DBT-funded National Mouse Research Resource (NaMoR) grant.

The first model, named Tg (K18-hACE2)/Blisc mouse, is a humanized model expressing the human ACE2 gene in the lung airways as well as other organs. These mice are available for shipment. More information can be found at: <https://www.ncbs.res.in/research-facilities/acrc>

The second is a humanized hACE2 mouse model. It is a Targeted Knock-IN hACE2-KI model in which the mouse ACE2 gene is replaced by the human ACE2 gene. This model is expected to more faithfully recapitulate the full endogenous spatio-temporal expression levels of ACE2.

In the third set, two different mAce2 'Knock-OUT' mice have been generated. In the first, Ace2-KO1/Blisc, the first exon of mAce2 has been deleted. In the second, Ace2-KO2/Blisc, there is a deletion of the entire 47Kb mouse locus. These mice would result in the complete loss and/or dramatically reduced Ace2 activity and function and would be resistant to COVID infection - they will be useful to understand the normal function of Ace2.



*BLiSC-ACRC facility staff handling/observing a new humanized ACE2 mouse.*

Current updated information on the availability of these mice is provided at: <https://www.ncbs.res.in/research-facilities/acrc>

Altogether these mouse models will allow researchers to study ways to block infection, understand how inflammation develops after infection and the short and long-term effects of the virus on different organs of the body. Importantly, the production of these mice within India avoids the delays in importing the animals from overseas. As a consequence, many Indian researchers can immediately test their ideas on how to combat the virus causing COVID-19 and make important contributions to stopping this pandemic.

The project was implemented by DBT-Institute for Stem Cell Science & Regenerative Medicine (DBT-inStem), in collaboration with National Centre for Biological Sciences, NCBS Animal Care and Resource Centre, and Mouse Genome Engineering Facility.

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**Website link:**  
<https://www.instem.res.in/>

## Webinar on “Nutrition: A weapon to combat COVID-19”

The DBT’s National Institute of Plant Genome Research (DBT-NIPGR), New Delhi and the National Academy of Sciences, India (NASI), Prayagraj organized a public webinar on the theme “Nutrition: A weapon to combat COVID-19” on October 01, 2020.



Dr Subhra Chakraborty, Director, DBT-NIPGR delivered the welcome address. She highlighted NIPGR’s scientific vision and the theme of the webinar. Prof. (Mrs.) Manju Sharma, former Secretary to the Govt. of India, Department

of Biotechnology, New Delhi and Distinguished Women Scientist Chair, NASI, Prayagraj, delivered the opening remarks. Dr Renu Swarup, Secretary, Department of Biotechnology, Govt. of India, delivered the inaugural address and Prof. G. Padmanaban, Hon’ble President, NASI, delivered the Presidential Address.

At a time when there is a pandemic, it is essential that every child develops a healthy eating pattern and has enhanced immune function. This requires resolute efforts from scientists/ academicians and tech-entrepreneurs to address the problem of ‘malnutrition/micronutrient deficiency’ and to educate children about the role of nutritious food in combating diseases. The objective of the programme was, consequently, to educate the school children of classes 9th to 12th. The target audience primarily remained school children, students, researchers, scientists and academicians.

In the webinar, the first lecture was delivered by Prof. Paramjit Khurana, Head, Department of Plant Molecular Biology, University of Delhi South Campus, New Delhi. Prof. Khurana is also General Secretary (OS), NASI. He spoke on “Meeting Nutritional Challenges for a Healthy Lifestyle.” The second lecture was on “What is Healthy Nutrition and its Effect on Immunity?” by Prof. Pramod Garg from Department of Gastroenterology, AIIMS, New Delhi.

Invitation to the webinar was sent by NIPGR to various Government and public schools and by NASI to Fellows of all the National Academies in India. It was open to the public and promoted through NIPGR social media platforms.

Contact info: [director@nipgr.ac.in](mailto:director@nipgr.ac.in)

### Website link:

[http://www.nipgr.ac.in/latest/latest\\_news.php](http://www.nipgr.ac.in/latest/latest_news.php)

<http://www.nipgr.ac.in/home/home.php>

## Outreach by scientists of DBT-NCCS, Pune, on COVID-19

Dr Yogesh Shouche delivered a popular science talk on ‘History of pandemics and what we learnt from them’, on 30th September, at the virtual “Sci Talk Lecture series” on Life Sciences organized by the Muktagan Exploratory. It was attended by over 1,000 students.

Dr Arvind Sahu delivered a webinar on ‘Dimensions of Biological Research during Post-COVID time’, at “COVID-19: Current Understanding”, organized by the School of Life Sciences, Central University of Gujarat, on 24<sup>th</sup> September, 2020.

Dr Shailza Singh delivered an invited talk on ‘Machine Learning-based Peptide Therapeutics for COVID-19’ on 24th September 2020, for Research Organization of Information and Systems (ROIS), Japan.

Dr Yogesh Shouche was also interviewed by a representative from the online magazine in Marathi, called “ऐसीअक्षरे” (Aisiakshare). This conversation, published online under the heading, “व्हायरस, कोरोनाव्हायरस, आणडितर काही” on 10 September, 2020, helped disseminate information about viruses, the coronavirus, biobanking and the NCCS CoE, NCMR.

Dr Shouche’s article on genome sequencing of the SARS-CoV-2 virus was published in the Marathi newspaper, Maharashtra Times, on 6<sup>th</sup> September, 2020. This article serves to increase public awareness about the DBT’s pan-India 1000 genome sequencing initiative and informs them about the significance of sequencing the viral genome and the outcomes of the studies on viral genome sequences from Indian patients.



Dr Yogesh Shouche’s article in the Maharashtra Times

Other invited talks include the following:

- i. Dr Shailza Singh delivered an invited talk on ‘Machine Learning for Engineering Biology in the Era of Network Science’, on 22<sup>nd</sup> September 2020, for the Institute of Mathematical Sciences, Chennai.
- ii. A panel talk by Dr Radha Chauhan on ‘Role of Academic organization in current challenges’ was delivered online at the MCCA’s Pune eHealthcare Summit and Virtual Expo; 29<sup>th</sup> September 2020.

Contact Info: Jyoti Rao (jyoti@nccs.res.in)

Website link: <https://aisiakshare.com/index.php?q=node/7811>

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# SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

# COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH (CSIR)

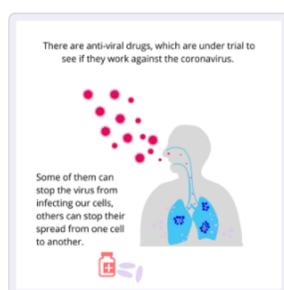
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## Dr Harsh Vardhan launches CSIR-partnered clinical trials website “CUREd”

Dr Harsh Vardhan, Minister of Science & Technology, Health and Family Welfare and Earth Sciences, launched a website that gives comprehensive information about the numerous COVID-19 clinical trials that CSIR is engaged in partnership with Industry, other government departments and ministries.

Called CuRED or CSIR Ushered Repurposed Drugs, the website provides information about the drugs, diagnostics and devices including the current stage of the trials, partnering institutions and their role in the trials and other details. The site can be accessed at <https://www.iiim.res.in/cured/> or <http://db.iiim.res.in/ct/index.php>.

**CUREd: CSIR Ushered Repurposed Drugs - A website that provides information on CSIR Partnered Clinical Trials.**



### CSIR partnered clinical trials on COVID-19:

There are no specific drugs available against the coronavirus SARS-CoV-2 that has caused the ongoing COVID-19 pandemic. However, developing new drugs against this coronavirus and testing for their efficacy and safety will take several years. Hence, efforts are on globally to fast track and test the drugs approved or tested for other viral diseases such as HIV or Ebola (called as repurposing). India is also participating some of these global trials, and is also carrying out its own clinical trials. CSIR is exploring all possible options ranging from repurposed drugs to new drugs to AYUSH products and biological therapeutics including vaccines. Collectively, CSIR has partnered in many such trials including AQCH - the first ever phytopharmaceutical drug under trial.

[CSIR partnered clinical trials on COVID-19: details](#)

The Minister lauded the efforts of CSIR for being at the forefront of the ongoing fight against COVID-19 and prioritizing clinical trials, generating data for their regulatory approval and helping launch drugs and diagnostics in the market. He commended the approach of using repurposed drugs and also synthesizing COVID-19 drugs through new processes and transferring to Industry.

CSIR is exploring multiple combination clinical trials of anti-virals with host-directed therapies for the potential treatment of COVID-19. CSIR is also working with the Ministry of AYUSH for clinical trials of AYUSH drugs and has undertaken safety and efficacy trials of AYUSH prophylactics and therapeutics based on individual plant-based compounds and in combination. Five clinical trials involving *Withania somnifera*, *Tinospora cordifolia* and *Piper longum* (in

combination), Glycyrrhiza glabra, Tinospora cordifolia and Adhatoda vasica (individually and in combination) and AYUSH-64 formulation are undergoing safety and efficacy trials.

A key clinical trial of CSIR is the Sepsivac (Mw) against COVID-19 in partnership with Cadila. The phase 2 clinical trial has been completed successfully on critically ill COVID-19 patients, and more extensive Phase 3 trial is on the anvil. Further, the Phase 2 trial of phytopharmaceutical AQCH on COVID-19 patients with Sun Pharma and DBT is underway.



In addition to clinical trials of repurposed drugs and vaccines, CSIR has been involved in clinical trials of diagnostics and devices.

Dr Harsh Vardhan emphasized that while the scientists are working on developing drugs and vaccines, as of now, social distancing, wearing masks and other precautions are essential and must be duly followed if we have to win the fight against COVID-19.

Dr Shekhar C Mande, Secretary, DSIR and DG-CSIR, Dr Ranjana Aggarwal, Director, NISTADS and Dr Geetha Vani Rayasam, Senior Principal Scientist and Head, Science Communication and Dissemination Directorate CSIR HQ were present on the occasion. CSIR Directors, Heads of Departments, and Scientists involved in Clinical Trials joined the event virtually.

**Website Link:**

<https://pib.gov.in/PressReleaseFramePage.aspx?PRID=1666171>

## **Rollout of the faster, cheaper FELUDA COVID-19 test expected in few weeks, says Dr Harsh Vardhan**

Union Health Minister Dr Harsh Vardhan said that the rollout of the FELUDA COVID-19 test will happen in the near future.

Dr Harsh Vardhan made the announcement while responding to a volley of questions fielded by his social media interactors on the fifth episode of Sunday Samvaad.

“Based on tests in over 2,000 patients during the trials at the Institute of Genomics and Integrative Biology (IGIB) and on testing in private labs, the test showed 96% sensitivity and

98% specificity. This compares favourably to ICMR's current acceptance criteria of RT-PCR Kit of at least 95% sensitivity and at least 99% specificity," he said.

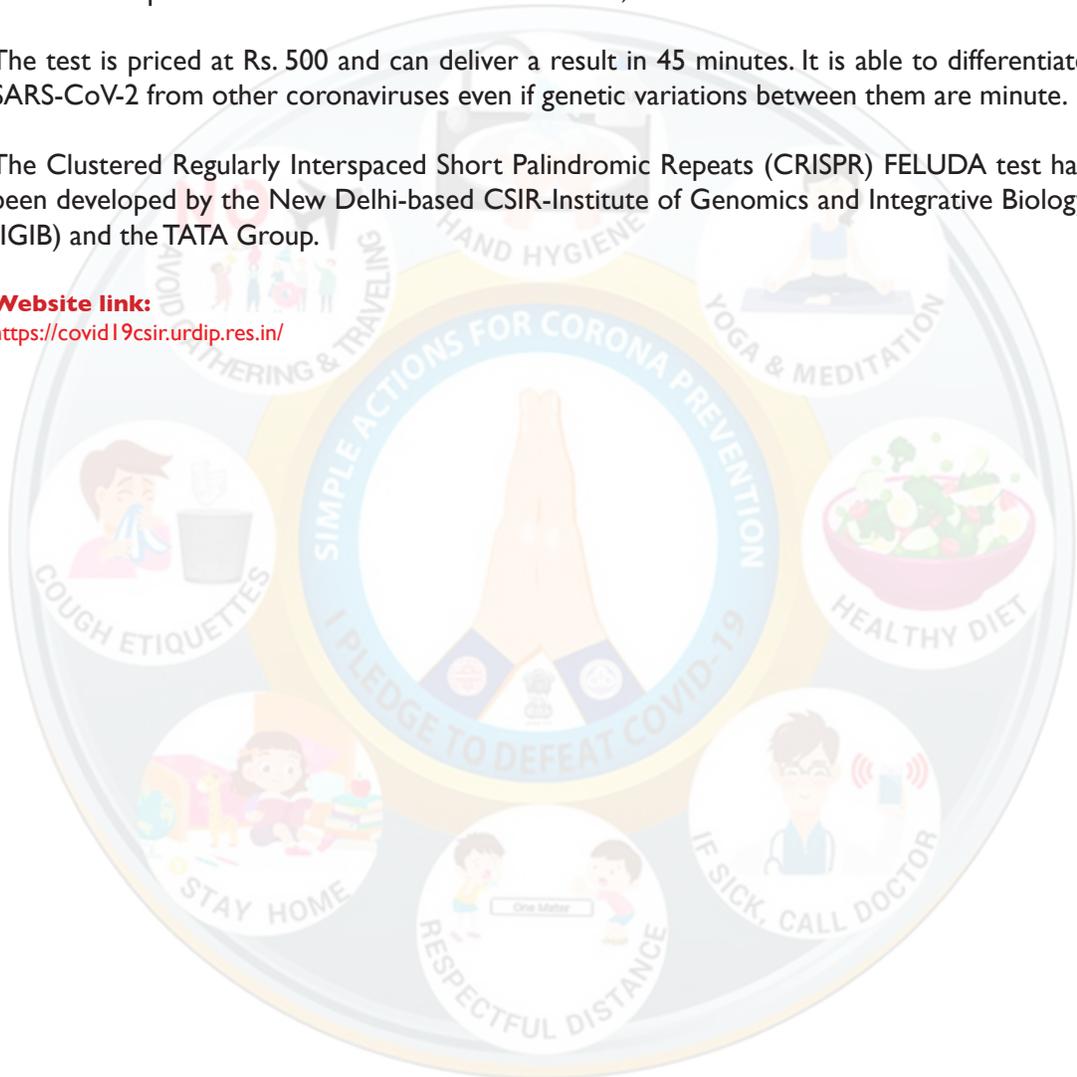
Sensitivity is defined as the ability of a test to correctly identify individuals with the disease, while specificity is the ability of the assay to accurately identify those without the disease.

He added that the FELUDA paper strip test for SARS-CoV-2 diagnosis has been developed by CSIR-IGIB and has been approved by the Drug Controller General of India for a commercial launch. The kit has already been validated by the Department of Atomic Energy's National Centre for Biological Sciences, Bangalore. "While I cannot put an exact date on the availability, we should expect this test within the next few weeks," he said.

The test is priced at Rs. 500 and can deliver a result in 45 minutes. It is able to differentiate SARS-CoV-2 from other coronaviruses even if genetic variations between them are minute.

The Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) FELUDA test has been developed by the New Delhi-based CSIR-Institute of Genomics and Integrative Biology (IGIB) and the TATA Group.

**Website link:**  
<https://covid19csir.urdip.res.in/>



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## SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

# INDIAN COUNCIL OF MEDICAL RESEARCH (ICMR) AND MINISTRY OF HEALTH & FAMILY WELFARE (MOHFW)

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### **Advisory on CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) technology-based SARS-CoV-2 test by ICMR**

ICMR, on 22<sup>nd</sup> October 2020, issued an advisory on Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) technology-based SARS-CoV-2 test. CRISPR SARS-CoV-2 test is a new diagnostic method based on CRISPR-Cas9 technology to identify and target the genetic material of SARS-CoV-2 virus. The test has been developed by Council of Scientific & Industrial Research (CSIR)-Institute of Genomics and Integrative Biology (IGIB), Delhi and has been validated by Department of Atomic Energy (DAE) – National Center for Biological Sciences, Tata Institute of Fundamental Research, Bengaluru.

**Website Link:**

[https://www.icmr.gov.in/pdf/covid/labs/Advisory\\_CRISPRtest\\_22102020.pdf](https://www.icmr.gov.in/pdf/covid/labs/Advisory_CRISPRtest_22102020.pdf)

### **ICMR issues advisory for use of Cartridge-Based Nucleic Acid Amplification Test (CBNAAT)**

ICMR, on 15<sup>th</sup> October 2020, issued advisory for use of Cartridge-Based Nucleic Acid Amplification Test (CBNAAT). This CBNAAT platform is similar to that of TrueNat and Cepheid Xpert Xpress SARS-CoV-2, that employ real-time RT PCR technology, which is in use for COVID-19 testing in India. TrueNat system has been validated by ICMR and Cepheid Xpert Xpress SARS-CoV-2 has been approved by US FDA for use under an emergency use authorization (EUA) only. Private laboratories which intend to initiate testing using CBNAAT should have NABL accreditation for molecular detection of RNA viruses either by Real-Time PCR or by specific CBNAAT platform.

**Website Link:**

[https://www.icmr.gov.in/pdf/covid/labs/Advisory\\_CBNAAT\\_15102020.pdf](https://www.icmr.gov.in/pdf/covid/labs/Advisory_CBNAAT_15102020.pdf)

### **ICMR invites letter of intent for participation in National Clinical Registry of COVID-19**

There is a pressing need for collection of systematic data on clinical signs and symptoms, laboratory investigations, management protocols, clinical course of COVID-19 disease, disease spectrum and outcomes of patients. Such data will serve as an invaluable tool for formulating appropriate patient management strategies, predicting disease severity, patient outcomes etc. In view of this, Ministry of Health & Family Welfare (MoHFW), ICMR, New Delhi and All India

Institute of Medical Sciences (AIIMS), New Delhi has proposed to launch a National Clinical Registry for COVID-19 (NCRC). The NCRC will aim at collecting good quality real-time clinical data to inform evidence-based clinical practice, research, formulating guidelines and policy making. In view of this, ICMR invites a letter of intent from institutions and hospitals identified as dedicated COVID Hospitals or dedicated COVID Health Centres under the project to establish National Clinical Registry of COVID-19.

**Website Link:**

[https://www.icmr.gov.in/pdf/covid/techdoc/Letter\\_of\\_Intent\\_National\\_Clinical\\_Regsitrty\\_of\\_COVID19\\_v1.pdf](https://www.icmr.gov.in/pdf/covid/techdoc/Letter_of_Intent_National_Clinical_Regsitrty_of_COVID19_v1.pdf)  
<https://www.icmr.gov.in/tender.html>

## **ICMR invites expression of interest for validation of rapid antigen detection assays for COVID-19**

ICMR invites applications for validation of rapid antigen detection tests for COVID-19 from all manufacturers who have developed such test. The gold standard RT-PCR diagnostic test for COVID-19 has limitations in terms of widespread availability. In view of this, there is urgent requirement of reliable and convenient rapid point-of-care antigen detection assays with high sensitivity and specificity. Such assays could be used as potential diagnostic tests in all possible public and private healthcare settings and made available for mass testing.

Contact Info: [guptanivedita.hq@icmr.gov.in](mailto:guptanivedita.hq@icmr.gov.in)

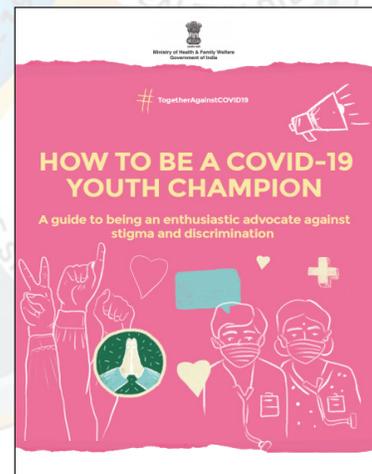
**Website Link:**

[https://www.icmr.gov.in/pdf/tender/Revised\\_EOI\\_for\\_Ag\\_kit\\_validation\\_19082020\\_v2.pdf](https://www.icmr.gov.in/pdf/tender/Revised_EOI_for_Ag_kit_validation_19082020_v2.pdf)  
<https://www.icmr.gov.in/tender.html>

## **Ministry of Health encourages the youth to advocate against stigma and discrimination during COVID-19**

In the context of healthcare, stigma is when any person/community sees someone in a negative way because of his/her illness. When a person is labelled by their illness they are no longer seen as an individual but as part of a stereotyped group. Negative attitudes and beliefs toward this group create prejudice which leads to negative actions and discrimination. Discrimination is when a person/community treats someone in a negative way because of his/her illness.

In the context of a disease outbreak, this means people are labelled, stereotyped, discriminated against, and treated separately because of a perceived link with a disease. Such negative treatment can affect those with the disease, as well as their caregivers, family, friends, community groups.



The current COVID-19 outbreak has provoked social stigma and discriminatory behaviours against anyone perceived to have been in contact with the virus such as doctors, nurses, frontline workers, sanitation workers etc. Because of which MoHFW is encouraging youth to advocate against stigma and discrimination during COVID-19 in the form of a guide. This guidance is designed to help young people develop as youth advocates and raise their voice against stigma and discrimination during the COVID-19 pandemic.

**Website Link:**

[https://www.mohfw.gov.in/pdf/EncouragingYouthtoadvocateagainstS&DduringCOVID19EnglishToolkit\\_final.pdf](https://www.mohfw.gov.in/pdf/EncouragingYouthtoadvocateagainstS&DduringCOVID19EnglishToolkit_final.pdf)

## MoHFW issues guidelines for management of co-infection of COVID-19 with other seasonal epidemic-prone diseases

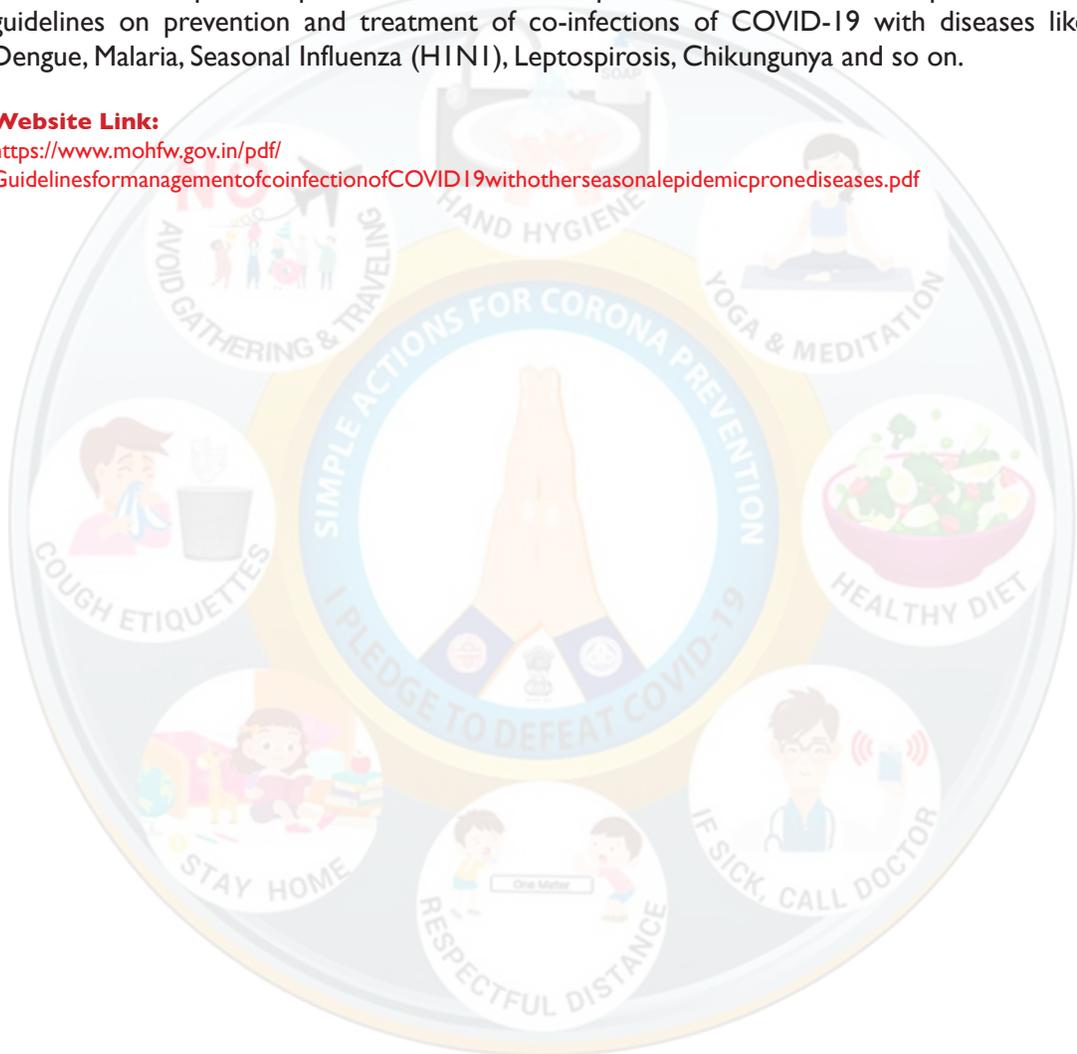
Almost all States/UTs of the country are affected by COVID-19. Given the seasonal pattern of epidemic-prone diseases observed every year in our country, diseases like Dengue, Malaria, Seasonal Influenza, Leptospirosis, Chikungunya, Enteric fever, etc. can not only present as a diagnostic dilemma but may co-exist in COVID-19 cases. This poses challenges in clinical and laboratory diagnosis of COVID-19 and has a bearing on clinical management and patient outcomes.

In this context, MoHFW issues guidelines for management of co-infection of COVID-19 with other seasonal epidemic prone diseases. The scope of this document is to provide clear guidelines on prevention and treatment of co-infections of COVID-19 with diseases like Dengue, Malaria, Seasonal Influenza (H1N1), Leptospirosis, Chikungunya and so on.

### Website Link:

[https://www.mohfw.gov.in/pdf/](https://www.mohfw.gov.in/pdf/GuidelinesformanagementofcoinfectionofCOVID19withotherseasonalepidemicpronediseases.pdf)

[GuidelinesformanagementofcoinfectionofCOVID19withotherseasonalepidemicpronediseases.pdf](https://www.mohfw.gov.in/pdf/GuidelinesformanagementofcoinfectionofCOVID19withotherseasonalepidemicpronediseases.pdf)



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## SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

# DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION (DRDO)

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### DRDO develops UV-C-based Virus Falcon for HVAC

DRDO has designed and developed a 'Virus Falcon' to deactivate virus and bacteria in the Heating Ventilation & Air conditioning (HVAC) system. It uses Ultra Violet C-band (UVC) light and Super Oxide Ions to reduce Biological Counts in HVAC system of a centralized air conditioned building.

The system has been designed to deactivate virus and bacteria at filter unit, cooling coil unit and plenum unit of the HVAC system.

UVC light and Super Oxide Ions are generated using a UVC Lamp Excitation Source (254nm) providing intensity of 13.4 mJ/cm<sup>2</sup>. The system Air Handling Unit (AHU) can handle Flow Rate of 14000-17000 cubic feet per minute which is suitable to sanitize air in flowing ducts of centralized air conditioned building.

The system has been tested by taking air samples before and after switching ON the AHU by using Andersen sampler. Biological Counts (Bacterial and fungal Count) in AHU were measured using Petri Plate Exposure Method at NABL accredited lab and total bacterial and fungal counts reduction achieved were 94% and 91%, respectively.



**Website link:**

<https://www.drdo.gov.in/uv-based-disinfection-devices>

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# SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

## SCIENTIFIC AND ACADEMIC INSTITUTIONS

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### IIT Kharagpur develops COVIRAP, novel testing method for COVID-19

IIT Kharagpur's COVIRAP – Novel Technology of COVID-19 Test got ICMR Certification. This new testing method implements a highly reliable and accurate molecular diagnostic procedure, conducted in an ultra-low-cost portable device unit and costs. This innovation has made high-quality and accurate COVID testing affordable for the common people with a testing cost of around Rs. 500 which can further be reduced through government intervention. This machine can be developed at a cost of less than Rs. 10,000 with minimal infrastructural requirement making the technology affordable to common people. The testing process in this new machine is completed within one hour. The test results are rendered via a custom-made mobile application for dissemination without requiring manual interpretation.

'COVIRAP', the diagnostic machine developed by IIT Kharagpur researchers, has been successfully validated for its efficacy in COVID-19 detection by the Indian Council of Medical Research (ICMR). Various commercial units have already approached the Institute for technology licensing to enable a rapid reach of this innovation to the common people.

Further, this would go on impacting the lives of many in rural India as the device is portable and can be operated on a very low energy supply. Minimally trained rural youth can operate this device.

## Testing Technology

BY SHREYOSHI GHOSH · PUBLISHED OCTOBER 21, 2020 · UPDATED OCTOBER 21, 2020



**REPORT**

RNaseP: **Positive**  
ORF-1b: **Positive**  
N GENE: **Positive**

**RESULT**  
**Positive**

Enter Patient Details

**Website Link:**

<https://kgpchronicle.iitkgp.ac.in/icmr-certifies-iit-kharagpurs-covid19-testing-technology/>

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# SCIENCE OUTREACH & POPULARISATION EFFORTS

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Since the outbreak of COVID-19 pandemic, the Ministry has supported numerous research projects and technology interventions through its various Departments, Autonomous Organisations, Professional Bodies, Statutory Bodies, and Laboratories. In this science outreach and popularisation efforts, a number of knowledge and information products have been generated and released.

## Efforts from Ministries, Departments & Scientific Organisations

### Government announces online nominations for Digital India Awards 2020 to honour exemplary initiatives in digital governance

The Government of India has consistently been deploying innovative digital solutions to enhance the quality and reach of government services to citizens. With each passing year, Digital-Governance initiatives are demonstrating the power of Information & Communication Technology (ICT) in improving the ease of living for all citizens. It is again time to commend these digital initiatives.

With the swiftly growing spread of internet and mobile, citizens are empowered to gain from government services using any digital device, anywhere, any time. As government entities at all levels - Centre, State and across India - continue undertaking various initiatives to provide accessible information and services, the Digital India Awards (DIA) offers an apt opportunity to showcase such initiatives. The Award, instituted under the aegis of National Portal of India, serves the purpose of bringing to the fore innovative digital solutions and thereby inspiring emulation by all government entities.

'Innovations in Pandemic' is one of the areas included this year to honour the exemplary innovative initiative taken up during the COVID-19 pandemic outbreak to honour the space within Science, Technology & Innovation.



Last date of application: 15<sup>th</sup> November 2020

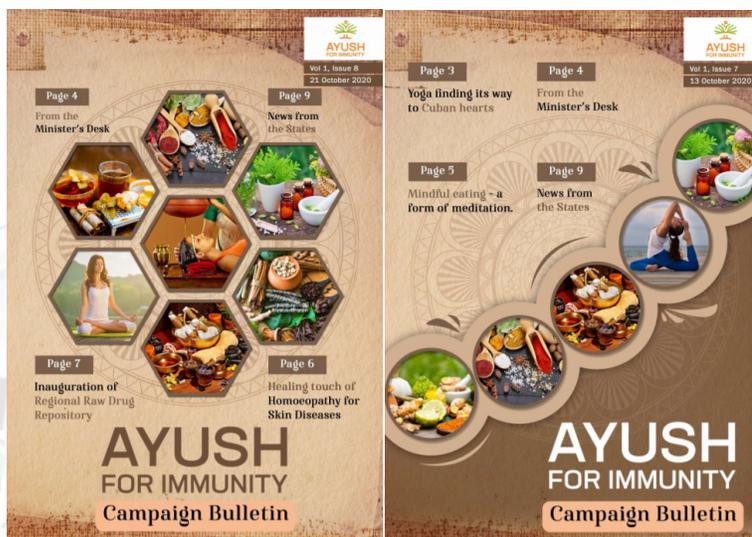
**Website Link:**

<https://digitalindiaawards.gov.in/>

## Ministry of AYUSH presents Ayush for Immunity Campaign Bulletin

The 'Ayush for Immunity' campaign was launched to increase awareness about Ayush practices that help improve health and immunity.

Ministry of AYUSH presents eight issues of the AYUSH for Immunity Bulletin. The increased interest seen globally in healthcare solutions rooted in traditional medicine and specifically in Ayush (traditional and non-conventional systems of healthcare recognized by the Government of India) disciplines, is indeed a positive development. The pandemic has led an increased realization about



the need to be pro-active about health. Particularly, interest has surged among people to understand practices that enhance immunity and disease resistance. Strengthening the body's natural defence system (immunity) is important to fight any disease, and particularly so in the pandemic situation.

Promoting and propagating preventive measures which strengthen our immunity would be of tremendous advantage to the people, in these times. The Ayush disciplines recommend many simple practices using commonly available gifts of nature, which can go a long way in maintaining healthy and happy living. The importance of awareness about oneself and the harmony each individual can achieve by uplifting and maintaining his or her immunity is emphasized across these disciplines

In the times that we are passing through efforts for maintaining good health and enhancing immunity have become essential. The 'Ayush for Immunity' campaign hopes to facilitate this by providing a steady stream of information on solutions and practices that are relevant in this context.

**Website link:**

<https://main.ayush.gov.in/ayush-for-immunity-bulletin>

## Drug Discovery Hackathon 2020 launched for drug discovery against COVID-19

Drug Discovery Hackathon 2020 (DDH2020) platform welcomes all those who wish to join the open-source drug discovery Hackathon against COVID-19. DDH2020 is a joint initiative of All India Council for Technical Education (AICTE) and Council of Scientific and Industrial Research (CSIR) and supported by Office of the Principal Scientific Adviser (PSA), Government of India, National Informatics Centre (NIC) and MyGov India.

The vision and mission of DDH2020 is to establish 'Open innovation Model' for *in silico* drug discovery against COVID-19 virus and will cover the various processes in drug discovery,

including but not limited to, *in silico* screening of molecules, lead optimization and identification of drug-able non-toxic targets. The targets/tools/lead molecules identified through the process of DDH2020 will be further taken forward for synthesis followed by subsequent steps in routine drug discovery programme.

Objective of the hackathon is to identify drug candidates that are effective against coronavirus SARS-CoV-2 by employing a hackathon for *in-silico* drug discovery, followed up by chemical synthesis and biological testing.

### The Hackathon consists of two major tracks:

Track-1 will primarily deal with drug design for anti-COVID-19 hit/lead molecule generation using tools such as molecular modelling, pharmacophore optimization, molecular docking, hit/lead optimization, etc.

Track-2 will deal with designing/optimizing new tools and algorithms which will have an immense impact on expediting the process of *in silico* drug discovery. Novel or refined tools/algorithms from Track-2 will help develop better models for predicting ADMET, *in silico*, thus improving screening efficiency.



Last date of submission for Phase-I: 31<sup>st</sup> October 2020

#### Website link:

<https://innovateindia.mygov.in/ddh2020/>

### Press Information Bureau releases daily bulletin on COVID-19

Press Information Bureau (PIB), Government of India releases a daily bulletin on COVID-19. The bulletin contains press releases concerning COVID-19, issued in last 24 hours, inputs from PIB field offices and fact checks undertaken by PIB. The last release is dated 28<sup>th</sup> October 2020.



- India continues to be among the countries with lowest per million cases & per million deaths
- With 10,66,786 tests in the last 24 hours, the cumulative number of tests conducted has crossed 10.5 Cr
- 43,893 new cases registered in the last 24 hours in the country whereas the new recovered cases stand at 58,439
- Presently the active cases comprise merely 7.64% of the total positive cases of the country standing at 6,10,803
- Telemedicine service, eSanjeevani, completes 6 lakh tele-consultations
- Shri Piyush Goyal calls upon the global community to ensure timely and equitable availability of vaccines and medicines for COVID-19, in sufficient quantities and affordable prices

#### Website Link:

<https://pib.gov.in/PressReleasePage.aspx?PRID=1668181>

## MyGOV initiates video blogging contest – Ayush se Jeevani Shakti – to spread awareness related to boosting immunity

Government of India takes an initiative through MyGov platform to create awareness for boosting immunity to be healthier and add to individuals' armour as an equipment to tolerate any flu-like infection borne by the microbiome.



### Website Link:

<https://www.mygov.in/task/%E0%A4%86%E0%A4%AF%E0%A5%81%E0%A4%B7-%E0%A4%B8%E0%A5%87-%E0%A4%9C%E0%A5%80%E0%A4%B5%E0%A4%A8%E0%A5%80-%E0%A4%B6%E0%A4%95%E0%A5%8D%E0%A4%A%E0%A4%BF-video-blogging-contest/>

## Government of India presents regular COVID-19 India factsheet

India's coronavirus cases have crossed 79-lakhs mark and as on 28<sup>th</sup> October 2020, 08:00 AM, stands at 79,59,509 cases out of which 72,59,509 have recovered. The recovery rate stands at 91.2% while the case fatality rate stands at 1.5%, one of the lowest in the world. Government of India, through its Open Government Data (OGD) Platform <https://data.gov.in/> has taken the initiative to present the regular factsheet related to COVID-19.



The OGD platform is aimed at supporting Open Data initiative of Government of India. The portal is used by various Ministries, Departments, and their organizations, to publish datasets, documents, services, tools and applications collected by them for public use. It intends to increase transparency in the functioning of Government and also opens avenues for many more innovative uses of Government Data to give different perspective.

### Website Link:

<https://community.data.gov.in/covid-19-india-trends-in-september-2020/>

## CSIR-NISCAIR brings out fortnightly e-Newsletter on COVID-19

National Institute of Science Communication and Information Resources (CSIR-NISCAIR) is bringing out a fortnightly newsletter dedicated to the COVID-19 outbreak. The newsletter covers stories and information on various aspects, like research, technology and innovation efforts to fight the pandemic and related awareness and sensitisation information. The last edition has been published on 15<sup>th</sup> October 2020.

### Website Link:

<https://www.niscair.res.in/covidbulletin>

<https://www.niscair.res.in/includes/images/covidbulletin/pdf/15october2020/15-october-2020.pdf>



## NIT Durgapur brings out special issue of newsletter on COVID-19

National Institute Technology (NIT), Durgapur brings out a newsletter dedicated for the COVID-19 outbreak. The newsletter covers stories and information on various aspects, like research, technology, lectures, webinars, talks and innovation efforts to fight out the pandemic and related awareness and sensitisation information.

 **National Institute of Technology Durgapur**  
NEWSLETTER: **Special issue on COVID-19**

**Director's message:**

The unprecedented outbreak of Covid-19 pandemic has halted normal activities all over the world and severely impacted all spheres including economic, social and cultural sectors. But we have to move on, and the show must go on. I am delighted that our NIT fraternity has lived up to their spirit and kept on completing their scheduled academic activities on time. I take the opportunity to render my gratitude to them for undertaking all assignments via online mode and carrying out responsibilities, apart from strictly adhering to all guidelines and SOP, as issued by the Ministry. I am happy to note that during this lockdown period, several faculty members have undertaken different projects, devised innovative instruments and gadgets (Section I), published articles (Section II), presented invited talks (Section III), organized webinars (Section IV) and eminent alumni lectures (Section V) related to Covid-19. I am also proud to mention that NIT faculty and staff members have donated ₹ 28 lakhs to PM & CM (WB) relief funds, sacrificing their two days salary. The Staff members have also shown their social commitment and concern by distributing food and other essentials to the marginal section of the population of adjacent neighborhood and mess workers, associated with the institute. This Covid-19 Special Edition of our Newsletter presents a brief account of our activities during this lockdown period. We vigorously hope that our highly energetic spirit would enable us to steadily stride against all odds in future.



*Prof. Anupam Basu, Director, NIT Durgapur*

**COVID-19 Related Activities**

**I. Projects ongoing and completed:**

**Title:** Design & Development of "PRANESH - An Automatically Pressurized AMBU Bag - An Economic Healthcare Solution"

**Investigators:** Dr. Nilanjan Chattaraj, Prof. Nirmal Baran Hui, and Dr. Hardik Rajyaguru (Rajyaguru Foundation);

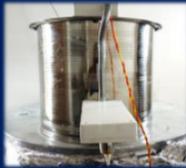
**Objective:** To develop an affordable, plug-and-use, and easily maintainable semi-automatic AMBU Bag ventilation system named 'PRANESH'. The system has been tested by agencies prescribed by ICMF and has successfully cleared the tests. The system is now ready for deployment.



**Title:** Design & Development of "Touch-less Hand Sanitizer/Alcohol Dispenser"

**Investigators:** Dr. Aniruddha Bhattacharya in coordination with Dr. T.K. Bera, Prof. S.S. Thakur and Prof. C. Koley;

**Objective:** To develop a dispenser which is touchless and can easily dispense alcohol-based sanitizer, following WHO's guidelines on COVID-19 so that contamination through the sanitizer dispenser can be avoided.



### Website link:

[https://admin.nitdgp.ac.in/files/activities/newsletters/2020/COVID\\_Special\\_Newsletter.pdf](https://admin.nitdgp.ac.in/files/activities/newsletters/2020/COVID_Special_Newsletter.pdf)

## Efforts from Vigyan Prasar

### India Science Channel

India Science is an Internet-based Over-The-Top (OTT) Science TV channel. It is an initiative of the Department of Science and Technology (DST), Government of India, implemented and managed by Vigyan Prasar (VP), an autonomous organisation of the Department of Science and Technology. This 24x7 video platform is dedicated to science and technology knowledge dissemination, with a strong commitment to spreading scientific awareness, especially with Indian perspectives, ethos and cultural milieu. The initiative is supported by the National Council of Science and Technology Communication (NCSTC), DST.

Science and Technology are the main driving forces of the nation and fundamental to progress and growth. So, the advantages of science and technology must reach all sections of society through popular media of communication. India's large Internet user base of 500 million is split between 305 million urban Indians and 195 million rural Indians, all of whom need to be reached with authentic science and technology content. And to do so, the Internet is fast becoming the most accessible and preferred media for content delivery.

Since the outbreak of COVID-19, India Science has been working tirelessly to connect with the people, in the form of regular bulletins, documentaries, interviews, bytes and live sessions of scientists, doctors, experts, science administrators and policymakers. The following is a brief of the information products produced by India Science.

1. Weekly COVID-19 video bulletin: Produced in both Hindi and English language weekly basis from 7 July 2020, COVID-19 bulletin apprises the audience about the latest development happening in S&T in India that are helping in managing and overcoming the challenges thrown up by the pandemic. Vigyan Prasar produced daily COVID-19 Bulletin from 11th April to 06 July 2020. Thereafter, a weekly bulletin is being produced which provides the most important S&T updates for the country related to COVID-19 front.



2. COVID Explained - Short films to explain important research finding related to COVID-19 in layman's lingo produced weekly basis. The subjects chosen for this short film caters to the curiosity of common man related to COVID-19.
3. Facebook live sessions on interviews of various stakeholders and media with DST Secretary.
4. Facebook and India Science live sessions on interviews of various resources person on COVID-19.

Contact info: kapil@vigyanprasar.gov.in

**Website link:**

<https://www.indiascience.in/>

## India Science, Technology and Innovation (ISTI) Web Portal

The India Science, Technology and Innovation Portal (ISTI) is a one-stop window for information about developments in India on science, technology and innovation. The portal focuses on bringing all stakeholders and Indian STI activities on a single online platform; helping efficient utilisation of resources; highlighting functioning of scientific organisations, laboratories and institutions; aggregating information on science funding, fellowship and award opportunities spanning from school to faculty level; pooling together conferences, seminars and events; and projecting science in India with its major achievements. The ISTI web portal has been developed by Vigyan Prasar, an autonomous organisation of the Department of Science and Technology (DST).

In the critical times of outbreak of COVID-19 pandemic, the web portal serves as a one-stop online information guide to bring together a collection of resources in response to COVID-19. These resources are generated by efforts made by numerous initiatives and schemes taken up by several Departments and Ministries of Government of India. These are being implemented by public-supported research institutions in India. The content presented here relies on the best available scientific understanding of the disease and its transmission.

The web portal provides all information related to COVID-19, its presentation of symptoms, transmission modes and mechanisms, and various models of protection of individuals, healthcare professionals and prevention from spreading to the community. The reasons, usefulness, and impact of social distancing have been communicated in an easy-to-understand manner. Around 2000 stories related to S&T efforts towards mitigating the COVID-19 pandemic have been captured on the portal.



**Science-Society-Setu  
for Aatmanirbhar Bharat  
(S<sup>3</sup>4ANB)**

Science-Society-Setu Web Clinic series will be in following sectors of Aatmanirbhar Bharat

- ▶ Agriculture and Allied Sectors
- ▶ MSME & Economic Sectors
- ▶ Social Infrastructure
- ▶ Cross-sectoral Area

Register at 

The Research and Development efforts made at Ministry level and various funding organisations are enumerated here on as-and-when-available basis. The innumerable infographics have been provided here are sourced from various organisations for efficient delivery of the information and targeting the common people as the largest stakeholder. The frequently asked questions and myth busters are also answered here.  
Contact Info: [kdgm@vigyanprasar.gov.in](mailto:kdgm@vigyanprasar.gov.in)

**Website link:**

<http://indiascienceandtechnology.gov.in/covid-19-the-pandemic>

## Fortnightly Publication of e-Newsletter on COVID-19

For the benefit of its stakeholders and target audience, Vigyan Prasar is bringing out a fortnightly e-Newsletter on the most relevant initiatives and efforts taken by Government of India through its various Science Ministries, Departments, and Funding Organisations. These organisations are continuously striving for combating the outbreak of COVID-19. These research-driven and technology-based interventions have been initiated to combat the outburst of the pandemic.

The e-Newsletter aims to be a handy guide to scientists, researchers, and scholars, especially those who are interested in knowing various aspects of COVID-19 and contributing to the coronavirus warfare and making the nation Aatmanirbhar.

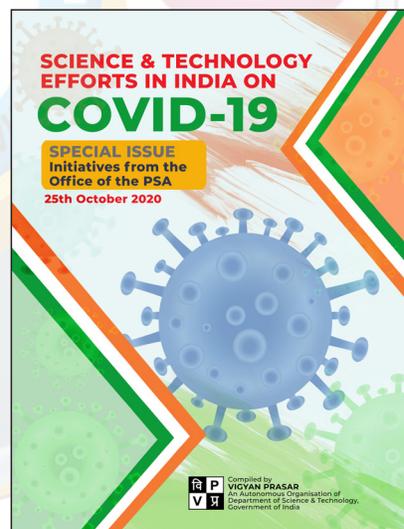
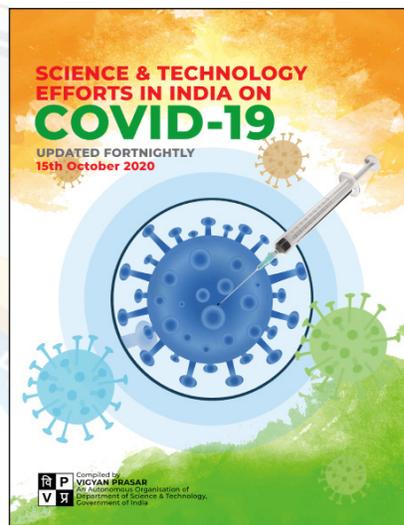
A special edition of the newsletter has been published, dated 25<sup>th</sup> October 2020, covering all the initiatives taken up and facilitated by the Office of the Principal Scientific Adviser (PSA). The issue illustrates all industry engagements and industry-academia partnerships that have been made operational during post-COVID-19 times to materialise solution-centric technological interventions towards the mitigation of the pandemic. Kisan Mitr initiative has been described in the edition in detail by providing intricate details of all of its seven phases. The initiative has been taken up considering the migrant labourers' empowerment and providing them solution-centric disruptive technological interventions to make them self-reliant. The edition also contains a compilation of all policy level interventions made in STI ecosystem after the pandemic outbreak.

Contact Info: [kdgm@vigyanprasar.gov.in](mailto:kdgm@vigyanprasar.gov.in)

**Website link:**

<https://vigyanprasar.gov.in/covid19-newsletters/>

<http://www.indiascienceandtechnology.gov.in/covid-19-the-pandemic/newsletter-archive>





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