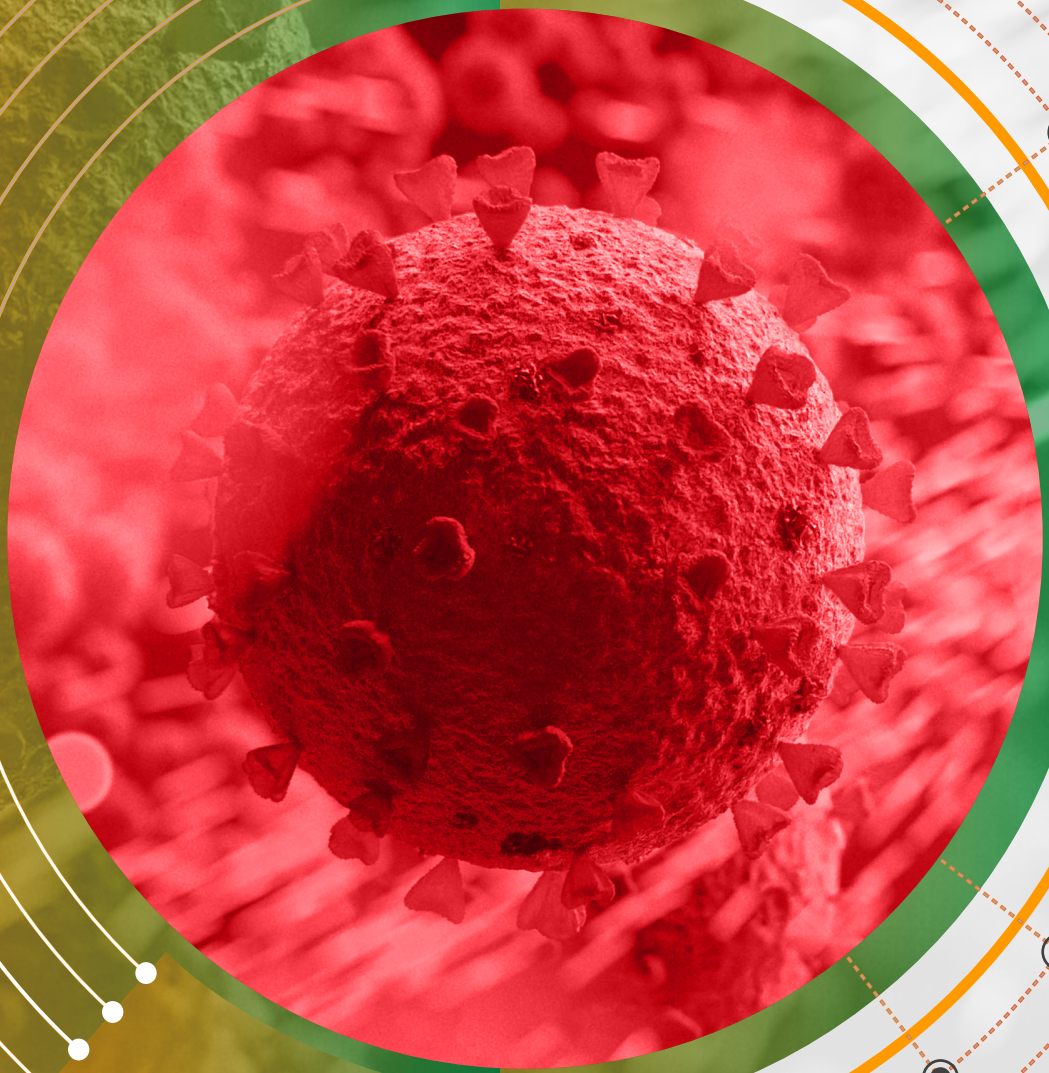
SCIENCE & TECHNOLOGY EFFORTS IN INDIA ON

COVID-19

UPDATED WEEKLY

9th July 2020



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

CONSOLIDATED ISSUE

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

सत्यमेव जयते

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

FOREWORD

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 COVID19.

(Dr. Harsh Vardhan)

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PREFACE

The COVID-19 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. All indications are leading to the conclusion that we all would have to learn to live with coronavirus, and there might be no early tapering off of the disease. This would require an adjustment to a NEW NORMAL of several aspects of our day-to-day life.

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. VP is a national level organisation of the Department of Science and Technology, Government of India, engaged in science communication and popularisation. The principal objective of VP is to serve India's science popularisation agenda. This is achieved through several strategically important two-way, stakeholder-specific approaches to communicate about principles and practices of science and technology and implications for development and quality of life. Science popularisation therefore serves as a robust knowledge-led tool to fulfil various mutually reinforcing public policy objectives.

For the benefit of the stakeholders and target audience, we are 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 weekly e-Newsletter. These organisations are geared for combating the epidemic of COVID-19. 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, like Science Ministries, Departments, and Funding organizations, has invited Calls for Proposals (CFPs) and Expression of Interest (EoIs) to enhance research and development-related activities to battle the pandemic out as well as making the nation self-reliant. Atmanirbhar Bharat, the vision of New India, will be fulfilled with aggressive implementation of the Make in India initiatives when we would be wholeheartedly 'Vocal for Local'.

The consolidated edition consists of the compilation of the developments in last week as well as impactful initiatives taken in the last quarter in fighting the evil out. 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.

Vigyan Prasar
New Delhi

PRESS RELEASES

Dr Harsh Vardhan launches Indian Red Cross Society's 'eBloodServices' Mobile App and congratulates for the initiative during COVID-19 crisis

Dr Harsh Vardhan, Union Minister of Health & Family Welfare launched the 'eBloodServices' Mobile App on 25th June 2020, New Delhi, developed by The Indian Red Cross Society (ICRS), here today, through a video conferencing. The Union Health Minister is also the Chairman of Indian Red Cross Society.

This application is developed by the E-Raktkosh team of Centre for Development of Advanced Computing (CDAC) under the Digital India scheme launched by Prime Minister Shri Narendra Modi in 2015. Dr Harsh Vardhan said, "In keeping with the people-centred vision of the Hon. Prime Minister, Digital India has now become an integral part of every person's daily life. This Blood Donation App is a prime example of how the Digital India Scheme is serving the need for accessing blood services." He added that "Many people require blood-related services regularly because of certain medical conditions in their families. Through this App, four units of blood can be requisitioned at a time and the blood bank will wait for as long as 12 hours for the person to collect it. This App makes it easy for those in need to request for Blood units at IRCS NHQ." At a time when the country is facing such a pandemic, the Mobile App will provide succour to all those who direly require blood, he stated.

Dr Harsh Vardhan Launched DBT – AMTZ Mobile Diagnostic Unit for COVID-19 Testing - I-Lab

The Minister for Science & Technology, Earth Sciences and Health & Family Welfare Dr Harsh Vardhan inaugurated and flagged off India's first I-Lab (Infectious disease diagnostic lab) for COVID-19 testing in rural and inaccessible areas of India, on 18th June 2020. Secretary of Department of Biotechnology, Dr Renu Swarup and other officials were present on the occasion. Dr Jitendar Sharma, CEO, Andhra Med Tech Zone CEO and senior officials from NITI Aayog, Ministry of Health & Family Welfare, MeitY, other ministries, ICMR, DST, CSIR etc. joined the function through web online.

Dr Harsh Vardhan elected as Chair of Executive Board of WHO

The Union Minister of Health & Family Welfare Dr Harsh Vardhan has been elected as Chair of the Executive Board of World Health Organization on 22nd May 2020 for the year 2020-21. This took place during the 147th session of the Executive Board, in a meeting that was virtually held. He has replaced Dr Hiroki Nakatani of Japan.

Digital Conference on 'RE-START – Reboot the Economy through Science, Technology and Research Translations' organised

The Union Minister of Science & Technology, Earth Sciences and Health & Family Welfare, Dr Harsh Vardhan said on 11thMay 2020 that India's fight against COVID-19 is moving fast ahead strongly and steadily. He was addressing a Digital Conference, RESTART – 'Reboot the Economy through Science, Technology and Research Translations', organised to celebrate the National Technology Day. The Conference was organised by the Technology Development Board (TDB) a statutory body of the Department of Science & Technology (DST) and Confederation of Indian Industry (CII).

Dr Harsh Vardhan launches 'AYUSH Sanjivani' app and inter-disciplinary studies involving Ayush interventions for COVID-19

Dr Harsh Vardhan, Union Health & Family Welfare Minister launched the 'AYUSH Sanjivani' App and two AYUSH-based studies related to COVID-19 situation on 7th May, 2020 in the presence of Shri Shripad Yesso Naik, MoS (I/c), AYUSH who participated through Video Conferencing from Goa.

Highlighting the importance of harnessing technology for COVID-19 response, the Union Health Minister said "The 'AYUSH Sanjivani' mobile app, which has been launched today, will help to generate data on acceptance and usage of AYUSH advocacies and measures among the population and its impact in prevention of COVID-19. It is developed by Ministry of AYUSH and MEITY and shall reach out to a target of 50 lakh people."

Dr Harsh Vardhan said DST & its autonomous institutions elevated science and technology in India to international levels, during the launch of COVID KATHA

Union Minister of Science & Technology, Health & Family Welfare and Earth Sciences, Dr Harsh Vardhan launched "COVID KATHA", a multimedia guide on COVID-19 on 3rd May. As DST enters 50 years of serving the nation through Science & Technology, the Golden Jubilee Celebrations were also launched, initiating myriad activities in different parts of the country throughout the year. Secretary (DST), Professor Ashutosh Sharma highlighted the major initiatives of DST, its vision for next five years and the steps DST is taking to identify and map technologies from R&D labs, academic institutions, start-ups, and MSMEs to fund nearly market-ready solutions for diagnostics, testing, healthcare delivery, and equipment and supplies to combat COVID-19.

Dr Harsh Vardhan said the country would be self-reliant in producing indigenous rapid test and RT-PCR diagnostic kits

Union Minister of Science & Technology, Health & Family Welfare and Earth Sciences, Dr Harsh Vardhan, on 28th April 2020 reviewed through video-conferencing the various initiatives undertaken by the Department of Biotechnology (DBT) and its Autonomous Institutes (AIs) and Public Sector Undertakings (PSUs) – BIRAC and BIBCOL to tackle the current COVID-19 crisis, especially with respect to progress made in indigenous development of vaccine, Rapid Test and RT-PCR diagnostic Kits. Secretary-DBT, Dr Renu Swarup informed that DBT has evolved a multi-pronged research strategy and action plan for immediate response as well as for long-term preparedness to tackle COVID-19. These multifaceted efforts include research towards development of candidate vaccines, therapeutics, and suitable animal models for COVID-19 as well as development of indigenous diagnostics and genomic studies on the host and pathogen. The DBT and its PSU, Biotechnology Industry Research Assistance Council (BIRAC) has

announced a COVID-19 Research Consortium Call to support diagnostics, vaccines, novel therapeutics, repurposing of drugs or any other intervention for control of COVID-19.

Government launched COVID INDIA SEVA to provide solutions to COVID-19-related queries

Union Minister of Health & Family Welfare, Science & Technology, and Earth Sciences, Dr Harsh Vardhan launched an interactive platform, COVID INDIA SEVA, on 21st April 2020. The initiative is aimed at providing real-time solutions to COVID-19-related queries. People can post their questions to the COVID INDIA SEVA twitter handle for getting swift replies from the team of trained experts. This initiative is aimed at enabling transparent e-governance delivery at large scale, especially in crises, like the ongoing outbreak of COVID-19 pandemic.

Dr Harsh Vardhan exhorted CSIR scientists to develop COVID-19 mitigation solutions to effectively combat the disease

Dr Harsh Vardhan, Union Minister for Science & Technology held a review meeting on 12th April 2020, with DG CSIR, Dr Shekhar C. Mande and all the CSIR lab directors through video conference of the steps undertaken by CSIR and its constituent 38 labs towards mitigation of Coronavirus outbreak in the country. Dr Mande informed that Core Strategy Group (CSG) has been set up in CSIR and the five verticals have been identified under which the COVID-19-related activities are being carried out. These include: Digital and Molecular Surveillance; Rapid and Economical Diagnostics; New Drugs/Repurposing of Drugs and associated production processes; Hospital Assistive Devices and PPEs; and Supply Chain and Logistics Support Systems. Dr Mande also mentioned that 15 CSIR labs are working in close partnership with major Industries, PSUs, MSMEs and other departments and ministries at the time of the crisis in the country.

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The consolidated edition consists of the compilation of the developments in last week as well as impactful S&T efforts initiated in last quarter.

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

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19
BY

OFFICE OF THE PRINCIPAL SCIENTIFIC ADVISER (PSA)

Office of Principal Scientific Adviser, Government of India, initiates KISAN MITR, a national digital platform, to support through technologies and scientific research for farmers to become Atmanirbhar

The Office of the Principal Scientific Adviser (PSA) to the Government of India has launched an initiative called *KisanMitr*. It is a seven-phase project aimed at supporting farmers to become *Atmanirbhar* (self-reliant).

The first three phases focus on creating a repository of agricultural technologies, livestock technologies, and scientific research to catalyze modernization of farming and solve information asymmetry. The engagement stage of the platform independently helps young start-ups to showcase their agricultural technologies and easily engage with market demand. Market demand includes Industry, Incubators and Farmer Producer Organizations (FPOs).

After the recent eruption of COVID-19 pandemic, reverse migration happened across the country, in which labours returned to their native villages. Through the KisanMitr digital platform, these migrant youths cannot just engage in farming but can also become agriculture-related entrepreneurs, helping their communities with modernization techniques.

The fourth phase focuses on creating a last-mile network for niche (nutritional, medicinal, aromatic, organic, GI-tagged) agricultural products from the fringes. Autonomous drones are being considered for development through a hub-and-spoke model of unmanned aerial vehicles (UAVs - land & Sky), especially in mountain states where the road networks might not have full coverage. Demand to be generated through charitable trusts for undernourished children as well as retail aggregators in metro cities.

The fifth phase focuses on equipping farmers with actionable agricultural insights and early weather alerts. Data related to soil health, moisture, weather, and ecology is being aggregated and analyzed to generate personalized insights related to crop selection, fertilizers requirements, and water needs for each farmer at farm-holding level. This would be provided by Ministry of Electronics and Information Technology (Meity) UMANG through an Atmanirbhar App.

The sixth and seventh phases look at micro-financing needs of the farmers and supplementing their incomes through off-farm products such as handlooms and textiles.

The project has received support from various departments of the government as well as private sector organizations.

Website Link:
https://farmer.indiancst.com/

Government announces an Innovation Challenge on COVID-19 Biomedical Waste Treatment

The Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC) through the Office of the PSA to the Government of India has set up the 'Swachh Bharat Unnat Bharat' Waste to Wealth Mission to identify technology solutions for India's waste challenges.

The mission invites technology applications from start-ups, corporates and entrepreneurs from research institutions to address the challenge of safe collection, disposal/treatment of large volumes of waste being generated during the ongoing COVID-19 pandemic which includes the use of masks, gloves, and PPEs by not only frontline workers and airports and railway stations but also by household community individuals such as municipal sanitary workers, barbers, the food business and the general population.

Eligibility Criteria: Indian industry, start-ups, entrepreneurs, research institutions are eligible to apply for innovations and solutions which can be deployed immediately.

Last date to apply: 15th July 2020

Contact Info: SBUB@investindia.org.in

Website link:
http://psa.gov.in/information-related-covid-19/COVID19-Waste-Treatment-Challenge

Impactful S&T efforts initiated in last quarter

Meeting demand side of agri technologies for farmers through S&T enablers call for agri technologies

With the relaxation of lockdown, India is facing a unique challenge of migration of a large number of workers from unorganised sectors in urban, peri-urban regions to villages and rural areas. This will require to rapidly engage the migrants moving to primary agricultural and rural livelihood settings by supporting them with effective employment opportunity locally through technological and innovative solutions to increase their efficiency and yield. This will also require youth migrants who could be supported by making them change agents or trained personnel for the deployment of technical know-how etc. in villages.

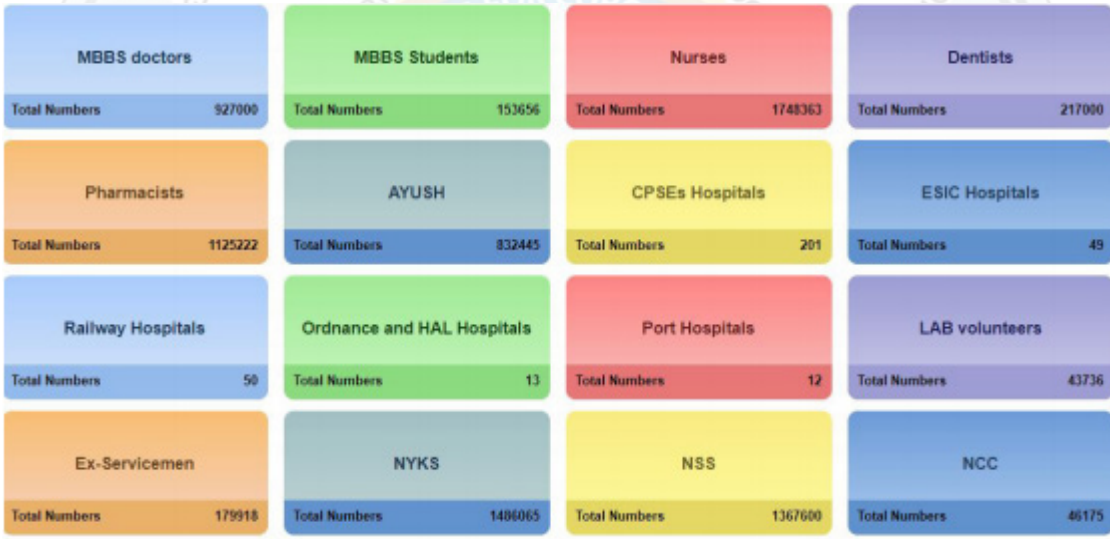
To meet the load on agriculture and to ensure sustainable farm and allied products including best rural practices, both agro-scientific research output and agri-technologies deployment will be essential at this juncture as an effective response through a COVID-19 Agriculture

track being launched by the Office of the Principal Scientific Adviser to Government of India. The objective of the call is to support the migrants and other agriculturists by providing access to scientific knowledge and innovative technologies as well as required capacity building by involving scientists and technologists from national laboratories and academic institutions along with their incubated start-ups from the supply side. Efforts will be made to bridge the supply side with the demand side by proactively involving enablers like industry, accelerators, foundations and public agencies to support technologies and solutions through evaluation for low cost, high quality, bankable and scalable projects in agriculture and allied areas. The range of scientific and technological products would include, amongst others, light equipment, scientific solutions and heavy-duty technologies.

The detailed project submission template of this call can be obtained by writing Email to: agritech.covid@gmail.com

Organization-wise COVID Warriors Dashboard

The Government of India has launched covidwarriors.gov.in to get doctors, paramedical staff, police and volunteers engaged in prevention and treatment of COVID-19. COVID Warriors portal aims to develop the capabilities of all individuals involved in prevention and treatment of coronavirus pandemic. This database contains information on 1.24 crore corona warriors.

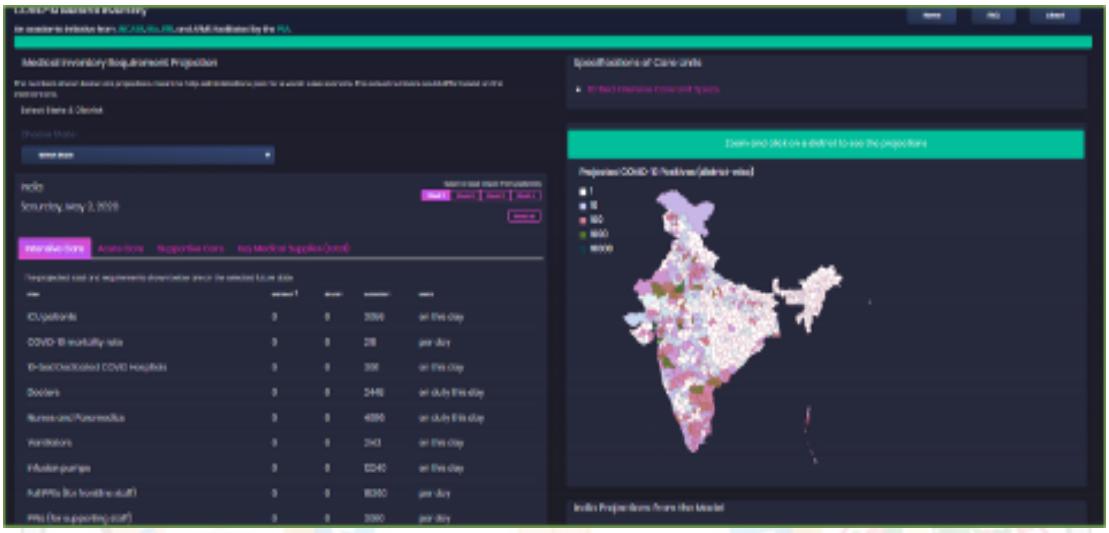


Website link:
https://covidwarriors.gov.in/

COVID-19 Medical Inventory

The COVID-19 Medical Inventory is an academic initiation from Jawaharlal Nehru Centre for Advanced Scientific Research (JNSCAR), Indian Institute of Science (IISc), Indian Institute of Technology Bombay (IITB), Mumbai, and Armed Forces Medical Services (AFMS), facilitated by

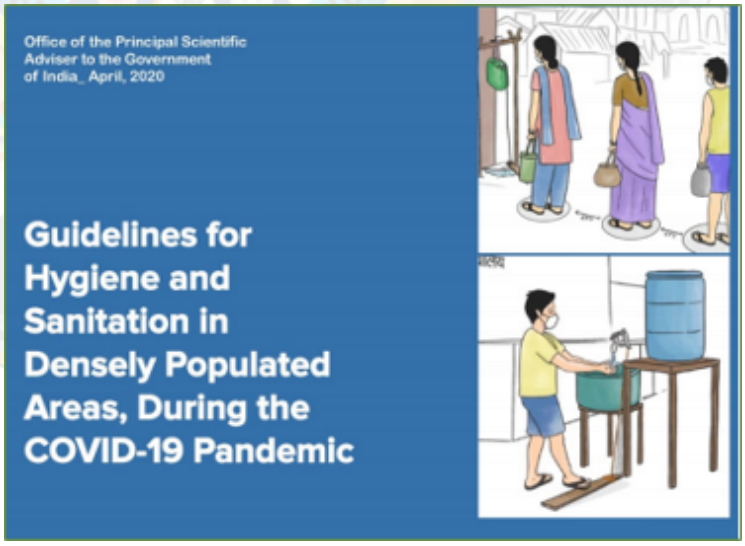
the PSA. This is a district-level short-term conjecture of medical inventory for COVID-19. This includes inventory for intensive and acute supportive care requirements. The mathematical model has been tuned with the recent data and the projections have now been revised. The numbers are projections meant to help administrations plan for a worst-case scenario; however, the actual numbers could differ based on the interventions. This web application provides a four-week projected requirement for various medical inventories across districts, states, and the national level. The initiative aims to be helpful in planning for infrastructure, arranging essential human resources and procurement of materials. MSMEs and other industries working in the production and supply chain of these essentials may use these projections to support their local government administration.



Website link:
https://covid19medinventory.in/

Foot-Operated Washing Station implemented at IAO

Foot-operated Washing Station, implemented at the Indian Astronomical Observatory (IAO), Hanle, Ladakh, provided an example for implementation in the 'Guidelines for hygiene and sanitation in densely populated areas, during the COVID-19 pandemic' released by the Office of PSA. IAO has one of the world's highest located sites for optical, infrared and gamma-ray telescopes. It is operated by the Indian Institute of Astrophysics (IIA), Bengaluru.



Website link:
http://164.100.117.97/WriteReadData/userfiles/PSA_DenseAreaGuidelines_Version8.pdf.pdf

Mobilising Scientific Community

The office of the PSA has played a coordinating role for government ministries/departments, scientific institutions, academia and enterprises to accelerate decisions on dealing with research and innovation-based actions to meet the COVID-19 challenges. Support has been provided to enable national, state and local bodies towards evidence-based action and to mobilise the scientific community for providing targeted solutions. To this end, the O/o PSA constituted the Science & Technology Empowered Committee for COVID-19 on 19 March 2020.

The Committee was chaired by Prof Vinod Paul, Member, NITI Aayog and Prof K VijayRaghavan, Principal Scientific Adviser and is responsible for coordination among science agencies, scientists, industries and regulatory bodies, and to take speedy decisions on research and development-related issues to tackle the SARS-CoV-2 virus and the COVID-19 disease. The Committee has worked towards implementation of scientific solutions to meet COVID-19-related challenges. It has enabled ICMR to issue the required notification allowing institutes under DST, DBT, CSIR, DAE, DRDO and Indian Institute of Science (IISc) to self-assess and prepare their BSL labs for research and testing of coronavirus through the standard and rigorous protocols as stipulated by ICMR.

A mechanism has been evolved between various STI funding ministries/departments/agencies to ensure a rapid and coordinated mechanism to support various research and innovation projects for

(i) A Task Force on Repurposing of Drugs (TFORD-COVID19) has been constituted to look into the status of scientific evidence, technology readiness levels, the status of IP, manufacturability in India etc. In depth information on various drug candidates will help to allow informed decision making. The regulatory/legal processes are also being addressed.

(ii) Mathematical models to track the disease spread and models to predict the medical equipment and auxiliary requirements of the COVID-19.

(iii) Manufacturing of test kits, ventilators, PPE in India.

The Government of India on 29 March 2020 constituted 11 Empowered Groups of Officers, under DM Act 2005, to engineer a well-planned & coordinated emergency response to ensure health & economic security of millions of Indians from COVID-19 outbreak. These Groups are empowered to identify problem and effective solutions; delineate policy; formulate plans; and take necessary steps for effective and time-bound implementation for these. PSA is a member of the Group responsible for coordinating with the private sector, NGO, International bodies for response-related activities.

Website link:
http://psa.gov.in/

Aarogya Setu links contact tracing and testing

The O/o PSA has been instrumental in the launch and outreach of the Aarogya Setu App. The App built through public-private-partnership will help people assess themselves the risk for their catching the Coronavirus infection by tracking infected cases in the vicinity. This is a data-protected App using cutting edge Bluetooth technology, algorithms and artificial intelligence tools.

The App will help the administration to take necessary, timely steps for assessing the risk of spread of COVID-19 infection and

ensuring isolation where required. The PSA also serves on a committee constituted by the Cabinet Secretariat to evaluate and ensure development and launch of Citizen App technology platform to help citizens and government in combating COVID-19 issues arising out of this pandemic.

Website link:
http://psa.gov.in/

COVID-19 critical medical supplies digital platform

COVID-19 critical medical supplies advisory cell is enabled by a digital platform to facilitate States with managing supply and demand of critical medical equipment and enable efficient decision making with regards to procurement of the same. The platform has been developed by Invest India (of DPIIT) in partnership with the O/o PSA and will be provided to the States through the MHA Empowered Committee. The portal will help:

- national demand aggregation of critical medical equipment;
- provide access to supplier information at one place – GeM, Invest India, Industry Association (FICCI, PhD Chamber of Commerce, CII, etc.);
- enable States to estimate numbers of critical medical equipment based on the number of patients and healthcare workers; and
- centralized query mechanism and online facilitation for States seeking advice on managing medical equipment demand/supply/usage single source of information for people, and infrastructure resources prepared by NSDS geotagging of crises management infrastructure (healthcare centres, isolation centres, etc.) along with the district-wise patient load.

Convergence on the COVID Innovation challenges: The Office of the PSA has converged efforts across various government departments and programme to identify innovations that can tackle COVID-19 challenges. The effort has (i) brought together DST, AIM, StartUp India and AGNIi to evolve standard criteria for evaluation and short-listing of best solutions; (ii) sensitise R&D and academic institutions and City Clusters to submit solutions for COVID-19 challenges; (iii) enable new potential technologies for testing at government labs/academic institutions; (iv) connecting with industry partners through CII for ensuring rapid manufacturing; (v) channelling financial resources and other enabling mechanisms for their implementation; (vi) so far 22 Start-ups have been shortlisted for support by AGNIi team from more than 400 applications.

Website link:
http://psa.gov.in/

Industry Engagement facilitated by the Office of the Principal Scientific Adviser

With the country facing an unprecedented crisis due to the coronavirus pandemic, the premier technical institutes have completely re-oriented their research ecosystem to develop solutions for the myriad issues that are coming up. This Herculean effort that lacks a parallel in modern history demands not only a significant commitment in terms of manpower and infrastructure but also a sizeable financial outlay. The industry has stepped up to do its part and help the country overcome this crisis by funding and collaborating on research projects with academia.

IIT Delhi developing PPE kits customised for healthcare professionals

The Indian Institute of Technology Delhi (IITD) joined hands with PNB Housing Finance Limited (PNBHFL) towards its fight against COVID-19 by developing personal protective equipment (PPE) for healthcare professionals.

IIT Delhi and PNBHFL have signed a Memorandum of Understanding under which IIT Delhi start-up ETEX incubated at IITD will be working to develop and deliver smart textile solutions for healthcare. The team has a strong expertise in textile engineering and has technical support from researchers and professionals from interdisciplinary backgrounds including electronics, medical, material and design. The team is committed to innovate advanced technologies related to protection (against pollution and COVID-19), pain, health monitoring and posture. PNBHFL, a leader in the construction finance, will be contributing corporate social responsibility (CSR) funds towards this project.

The COVID-19 pandemic has triggered an unprecedented lockdown in many geographies globally. All public and private stakeholders must contribute their mite in stopping its spread. As part of its societal responsibilities, PNBHFL has joined hands with IIT Delhi in ensuring the contribution to the nation's effort in flattening the COVID-19 curve. Through this partnership, PNBHFL aims to play a meaningful role in safeguarding the well-being of corona warriors, who are risking their lives by putting service before self, day after day. Prof. Bipin Kumar, Department of Textile Technology is spearheading this project.

IIT Kanpur – Nocca develops Invasive Ventilator with IoT-enabled features

Nocca Robotics Pvt. Ltd is engaged in designing and manufacturing robots that clean solar panel in a waterless manner. Using the Team's extensive experience in electromechanical control systems in their regular business, they decided to contribute in nation's fight against COVID-19, by designing a ventilator along with the active involvement and guidance from the incubator of IIT Kanpur. An experienced team of pulmonologists and intensivists from India and overseas has been advising the Team on the design principles of invasive ventilators. The development is aided by an experienced group of Indian business leaders and biomedical engineers.

The ventilator has been designed in a way so that

- It can be manufactured at a large scale at multiple sites;
- It can work with medical airline plus oxygen as well as ambient air plus oxygen thus providing the versatility to operate under both conditions; and
- It meets all the essential specifications laid out by the Government of India.

The designed mechanical ventilator can operate in PC-CMV, PC SIMV, PSV, VC-SIMV, VC CMV, PRVC, ACV, CPAP and BPAP modes. The ventilator is permanently connected to a mobile phone which is used to control the device and display critical information. The IoT-enabled feature creates an efficient Ventilator Management System that allows:

- doctors to control the ventilators remotely and thus ensuring lesser exposure to COVID-19 patients and/or ventilator and
- control of multiple machines with one IoT device thus addressing the problem of limited availability of trained doctors.

Current Status:

- The product is currently at the compliance and pre-clinical testing stage.
- The project has been a brilliant union of the academia, start-up and hospital. This was possible with industry being the major component of all, binding everyone together.

Industries supporting the project:

i) ***ACT Grants:***

Description: ACTS Grants is the Action COVID-19 Team equipped with Rs. 100 crore grant created by India's start-up community to give wings to ideas that could combat COVID-19 with immediate impact. They have been seeking capital-efficient, scalable solutions from NGOs and innovative start-ups which need an initial seed grant to fight the spread of the pandemic. Many organisations like MMT, Dell, Infoedge, and, members of funds like Accel, Aavishkaar, Sequoia, and Unitus, have donated in personal capacity. For more details, please visit www.actgrants.in

Support: The ACT grant is currently being used for prototype development and preclinical trials of the product.

ii) ***Ansys:***

Description: Ansys offers a comprehensive software suite that spans the entire range of physics, providing access to virtually any field of engineering simulation that a design process requires. Organizations around the world trust Ansys to deliver the best value for their engineering simulation software investment. During the COVID-19 pandemic, Ansys is also striving to positively contribute to the battle against coronavirus. Ansys is supporting the ongoing initiatives of its customers and partners.

Support: The fund by Ansys has helped the product's initial research and development.

iii) ***Standard Chartered:***

Description: Standard Chartered Bank is India's largest international bank with 100 branches in 43 cities.

Support: These funds were one of the early ones and helped in the project's initial product R&D.

iv) ***ICICI Securities:***

Description: ICICI Securities Limited is a Registered Investment Advisor under SEBI Investment Adviser Regulations, 2013 and has been offering advisory services under the brand ICICIdirect Investment Advisory Services.

Support: The funds were used in the project's initial product R&D.

v) ***Cummins India:***

Description: Through Cummins Technologies India Pvt. Ltd., Cummins is at the forefront of designing future technologies for turbos, emissions, fuel systems and more.

Support: Cummins is helping the project by supplying one of the most critical components in the ventilator – the flow sensors.

vi) ***Naukri.com:***

Description: Naukri.com is a recruitment platform that provides hiring-related services to corporates/recruiters, placement agencies and to job seekers in India and overseas.

Support: These funds are currently helping the project with prototyping and compliance testing of the ventilator.

vii) ***AdorPowertron:***

Description: AdorPowertron is the world's leading solution provider of high frequency & conventional high voltage rectifier transformer sets that are deployed for clean air applications (including electrostatic precipitators for power stations, cement, pulp & paper + steels plants and roads). They are also India's largest provider of traffic safety & enforcement solutions, including speed enforcement systems & IP and electronic Variable Messaging Signs/Commercial LED Walls.

Support: Conversation is on with Ador for mass manufacturing of the product starting next month.

Venture Center's initiative on developing simple and low cost face shields for healthcare workers and police forces gets support from Cummins India Foundation, Persistent Foundation & Kirloskar Brothers Ltd Pune

One of the ways in which the human-to-human transmission of the SARS-CoV-2 virus occurs is through respiratory droplets generated when people cough, sneeze, or exhale. Thus, healthcare workers, police personnel, and caregivers of suspected/confirmed COVID-19 patients are mostly at risk of getting infected.

To safeguard the health of these workers, enthusiastic staff and entrepreneurs at Entrepreneurship Development Center (Venture Center), a technology business incubator hosted by CSIR-National Chemical Laboratories in Pune have designed and manufactured a simple and low-cost face shield, which provides a physical barrier between the workers and other people they interact with, significantly minimizing their contact to the infection.

A glimpse of beneficiaries and various activities on development of Face Shields at Venture Center

The face shield comprises of a transparent clear polyester sheet that protects the face from any airborne fluid particles. The sheet is kept in place with the help of a headband and an elastic strap. The face shield design uses MDF and can be machined (instead of laser cutting), which makes the process simpler, cheaper and scalable.

The designs are now available freely for download under a Creative Commons Attribution – Non Commercial – ShareAlike 4.0 International Public License.

Anyone can use the knowhow freely for non-commercial use (means that you will price it reasonably and provide at affordable costs and make it available without unfair discrimination). So far, nearly 1 lakh face shields have been delivered to healthcare workers and police forces across the country.

This initiative has been generously supported by:

- Cummins India Foundation: Founded in 1990 as an independent legal entity, the Cummins India Foundation (CIF) channelizes Cummins' commitment towards Corporate Responsibility.
- Persistent Foundation: It was formed in 2009 to institutionalize Corporate Social Responsibility within Persistent. The Persistent Foundation supported donation of face shields for frontline staff in hospitals in Pune.
- Kirloskar Brothers Ltd. Pune: Established in 1888 and incorporated in 1920, Kirloskar Brothers Limited (KBL) is the flagship company of the $ 2.1 billion Kirloskar Group

IIT Delhi & NCL Pune developed an ELISA-based assay for COVID-19 testing

Indian Institute of Technology Delhi (IITD) and National Chemical Laboratory (NCL) Pune joined hands to create an economical process for manufacturing the antigens used in ELISA and home-based diagnostic kits to offer effective, quick, robust and affordable diagnostic solutions to fight COVID-19 outbreak. The initiative is being funded by Microsoft.

The two institutions are developing ELISA-based assays for qualitative measure of human anti-COVID-19 IgG and IgM antibodies in serum. Risks related to RT-PCR-based methods are minimized by developing IgG and IgM-based ELISA assays and home-based testing kits. ELISA for the detection of COVID-19 is helpful in diagnosis of current burden of COVID-19 patient samples in this ongoing pandemic. The resulting assay is expected to provide robust, quick, reliable and economical solution for mass testing of novel coronavirus. This novel expression system will aid private sector companies to provide home-based detection kits economically. This project is spearheaded by Prof. Anurag S. Rathore, Department of Chemical Engineering, IIT Delhi and Dr. Rahul Bhambure, NCL, Pune.

IIT Delhi developing infection-proof fabrics

Indian Institute of Technology Delhi (IITD) is developing infection-proof fabrics to prevent hospital-acquired infections (HAIs) through its start-up Fabiosys Innovations Private Limited. The mission at Fabiosys is to make hospitals safer. The public healthcare facilities in developing countries like India have always been crowded. According to the statistics from Ministry of Health and Family Welfare (MoHFW), for every 100 hospitalised patients in developing countries, 10 patients get HAIs. This initiative is being funded by Huawei Telecommunications (I) Co. Pvt. Ltd.

The Fabiosys team has been working for the past 1.5 years for developing "infection-proof fabrics" to prevent HAIs. The fabric developed by Fabiosys kills around 99.9% of the pathogens in 1-2 hours. The team has developed an affordable novel textile processing technology which converts regular cotton fabrics into infection-proof fabrics. They take rolls of cotton fabrics and treat those with a set of their proprietary developed chemicals under a set of particular reaction conditions using the machinery already commonly available in textile industries. The fabric, after undergoing these processes, gains powerful antimicrobial functionality.

The Fabiosys Team is mentored by Prof. Samrat Mukhopadhyay, Department of Textile and Fiber Engineering, IIT Delhi with an expertise in textile chemical processing and professors from various departments of AIIMS Delhi.

IIT Madras start-ups' efforts to develop 'Portable Hospital Unit' funded by Wells Fargo

With a contagious disease such as COVID-19, it is essential to have smart health infrastructure to screen, contain and treat people. Unlike urban areas, rural areas do not have plenty of existing infrastructure that can be converted to hospitals. There it is difficult to construct buildings from scratch as the requirement is immediate.

Wells Fargo, an American multinational financial services company, is providing funding support to an IIT Madras-incubated start-up called Modulus Housing to tackle this problem. The start-up has developed a portable hospital unit that can be installed anywhere within two hours by four people.

Called 'MediCAB,' it is a decentralised approach to detect, screen, identify, isolate and treat COVID-19 patients in their local communities through these portable microstructures. It is foldable and is composed of four zones – a doctor's room, an isolation room, a medical room/ward and a twin-bed ICU, maintained at negative pressure.

The major advantage of decentralised micro infrastructures is that these can be used across the nation. These microstructures can be shifted to rural India. Hence, this can be one-shot two-kill scenarios and can be put to good use even after COVID-19 is eliminated from the country.

Infineon Technologies provides funding support to IIT Madras start-up to develop power backup system for ventilators

COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). While the majority of cases result in mild symptoms, some progress to acute respiratory distress syndrome, requiring mechanical ventilation. For such patients, ventilators have become the difference between life and death.

Reliable power backup for ventilators and isolation homes in B & C towns, where power availability is not reliable or at the remote locations which are off-grid has become essential. This will save substantially the need for diesel generators for powering such systems in the rural areas. Towards this, Infineon Technologies AG, a German semiconductor manufacturer, is providing support to Cygni Energy, an IIT Madras incubated start-up, to develop a power backup system for the ventilators. The power backup for ventilators will be targeted towards off-grid and weak-grid areas.

Cygni Energy Pvt. Ltd. is an IIT Madras incubated start-up, established about five years ago, working in the domain of efficient DC solar power backup. Cygni has numerous inventions in the area of solar-DC and is a pioneer in this field.

Persistent Foundation supports TRAC study, a retrospective analysis for COVID-19

The Principal Scientific Adviser to the GoI, Dr K VijayRaghavan, has constituted an S&T Core Group on COVID-19. Under the aegis of the S&T Core Group on COVID-19, a Task Force has been constituted focused on repurposing of drugs for COVID-19. The Nerve Center is located at Entrepreneurship Development Center (Venture Center), Pune. The team has gathered in-depth information on various drug candidates to allow informed decision making.

In order to design better trials and choose potential therapies effectively, there is a need to understand what kind of symptoms patients are presenting with, the kind

of therapies being used by doctors for clinical management and their effects. In this context The TFORD has initiated a Retrospective Study in Pune recently to collect clinical management information for COVID-19 patients and to evaluate the efficacy and safety of currently used treatments for hospitalised COVID-19 patients. This study, which aims to collect and curate clinical management information of COVID-19 patients will significantly aid in understanding which therapies could be most beneficial for the Indian population and going further aid in their testing through clinical trials. The study is being funded by Persistent Foundation.

Website Link:
https://nclinnovations.org/covid19/trac/

Asian Paints supports MyLab Discovery Solutions to stock emergency supply of COVID-19 testing kit – PathoDetect

There has been a steady increase in testing capacity over the last few months in India. Currently, over one lakh tests are being performed every day. To help with this increased demand for testing India has been importing testing kits from China, Germany, South Korea and other 3 countries. However, these imported kits were not enough for a populous country like India. Thus, ICMR has been looking at indigenous testing kits to prepare itself to conduct mass testing and create an emergency supply bank to meet this requirement in the coming weeks.

MyLab Discovery Solutions, incubated at NCL Venture Center, has developed a COVID-19 testing kit, named PathoDetect, which has received approval from CDSCO in a record 6 weeks' time. PathoDetect offers an in vitro diagnostic real-time PCR assay for qualitative detection of the 2019-novel Coronavirus RNA in respiratory specimens and sera. The kit offers universal detection of SARS-like coronaviruses and specific detection of 2019-nCOV. Each indigenously produced PathoDetect kit can test 100 patients at 1/4th the cost of an existing kit, thus significantly reducing the financial burden on the government. Moreover, Mylab's PathoDetect kit is very simple to use and can significantly expedite the testing process, as it provides results in just 3 hours, compared to the 7+ hours required for existing kits in the market.

Asian Paints Limited has extended financial support to Mylab Discovery Solutions to manufacture and keep available an emergency stock of kits required to help in mass testing. The fund will help MyLab take the necessary inventory risks, plan supplies in advance and meet the growing needs. Currently, MyLab has an existing manufacturing capacity of 25,000 tests per day, but can be enhanced to 40,000 tests per day by further automation.

Portable Fluorescence Reader to enable PCR-based tests for COVID-19 diagnosis, supported by Infineon Technologies

The WHO-approved diagnostic test for COVID-19 is a reverse transcription-polymerase chain reaction (RT-PCR) test that requires high-end equipment, a number of lab accessories and skilled technicians to operate, along with approved testing kits. Only a limited number of labs in the country are equipped with RT-PCR facilities, and the goal of this project is to develop assays and instrumentation that result in cheaper testing kits that do not require these expensive set-ups.

These involve the use of cheaper and widely available PCR thermal cyclers for the RNA amplification process, in combination with intercalating dyes for detection (instead of conventional dyes that use a probe and are very expensive), as well as the development of a reader that measures the resultant fluorescence emissions. These fluorescence readers have been validated in diagnosing other diseases as part of previous research at Indian Institute of Science (IISc) and are currently in the process of being validated for COVID-19 testing. Infineon Technologies has provided a CSR grant for this project.

IIT Madras partners with Infosys for blockchain-based tracker technology for human-to-human transmission of contagious disease and renovation of healthcare infrastructure

The COVID-19 outbreak has revealed starkly the inadequacy of healthcare infrastructure in the U.S., Italy, China, U.K. and other countries to handle such crises. This is an alarm signal for India also to renovate and overhaul its overall healthcare management system so that it is flexible and robust while delivering quality. Towards this a solution is being developed by IIT Madras in collaboration with the IT Firm Infosys - called 'BlockTrack' – which can play a vital role. This project envisages a solution leveraging Blockchain, Internet of Things (IoT) and AI/ML (Artificial Intelligence/Machine learning) and could be disruptively beneficial. The project seeks to build an infrastructure for single-point records, interoperability and track unwanted or new contagious diseases spreading in the population. The Blockchain-based solution seeks to maintain tamper-proof record of movements of target persons and interoperability among health organizations. These records track pre-identified contagious disease carriers and help health organizations to work in synchronization with each other, across geographies. The following are the key points of 'BlockTrack':

- Unique patient records for identification without duplication of data;
- Interoperability across platforms and geographies;
- Supply chain management using tamper-proof Blockchain technologies; and
- Tracking movement and gathering information around proximity (especially during the outbreak of new diseases).

IIT Jodhpur develops innovative face shield and sterilisation system for N95 masks

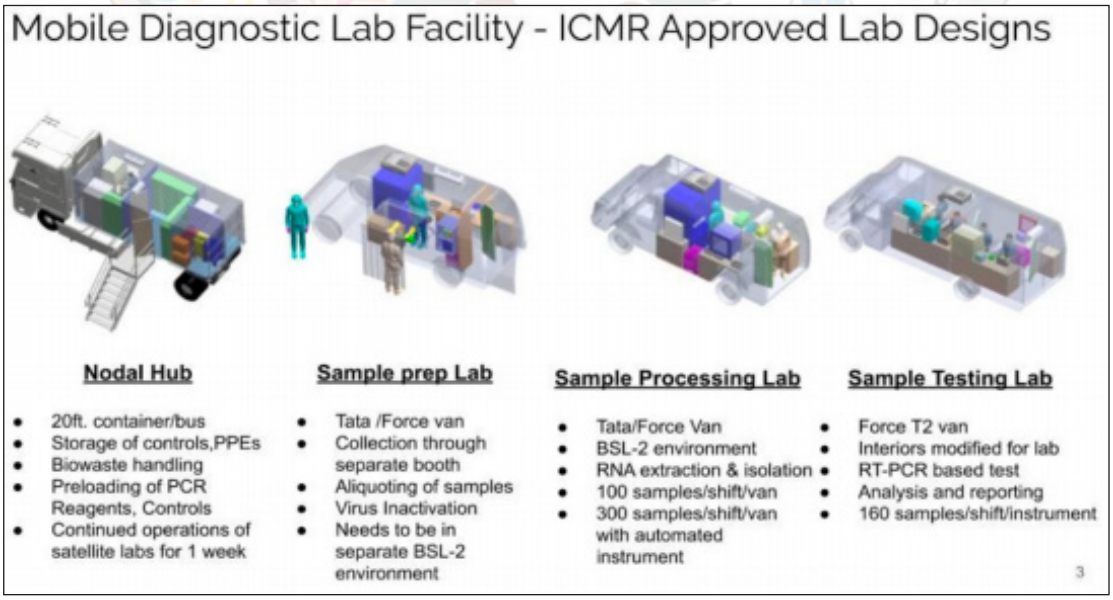
In the unprecedented COVID-19 crisis, CII has significantly contributed in building collaborations wherever possible, between companies and academic institutions. In partnership with ACMA, SIAM, IMTMA and SIDM, CII formed a network of companies for augmenting the inventory of ventilators through manufacturing by utilising their resources such as plant and machinery and highly skilled manpower to mass-manufacture ventilators or through import.

Parallelly, with the support of the PSA's office, a consortium of innovative COVID-19 technologies, offered by industry and start-ups incubated by national research laboratories, government agencies and academic institutions, was also formed to make technologies available for industry partnerships. In its efforts towards developing technologies against COVID-19, IIT Jodhpur has developed an innovative face shield, which is now available in the market as a

commercial product of M/s Iscon Surgicals Ltd, Jodhpur, and a few thousand units have been manufactured and already sold. Besides this, the Institute has also developed an advanced photocatalytic oxidation sterilization system based on UV-light and metal oxide nanoparticles catalyst to treat N95 filtering facemask respirators for reuse. The technology - the knowhow of the sterilisation system - has been transferred to seven firms namely M/s Iscon Surgicals Pvt Ltd, Jodhpur, Rajasthan; M/s Kamtech Associates Pvt Ltd, Jaipur, Rajasthan; M/s Chempharm Industries India Pvt Ltd, Sonipat, Haryana; M/s. Parappadi Technologies (P) LTD, Trivandrum, Kerala; M/s Johri Digital Healthcare Ltd, Jodhpur; Mai Bharat Society, Jaipur; and M/s Zintex Blue Ocean Pvt Ltd, Jaipur in May 2020. These firms are in the process of the development of these products.

IISc builds Mobile Diagnostic Lab for COVID-19, supported by Toyota Kirloskar Motors, Tata Motors and SBI Foundation

Studies from across the world have highlighted the effectiveness of large-scale testing in managing the spread of new COVID-19 cases as well as reducing mortality, especially with early detection of asymptomatic cases. As the pandemic spreads to the interior parts of the country that do not have access to advanced molecular diagnostic test capabilities, there is an urgent need to build and deploy safe and accurate testing capabilities at various locations. Towards this goal of scaling up testing capabilities to reach remote areas and reducing turnaround times from sample collection to test results from 1-3 days, this project is working on building a mobile diagnostic laboratory. An ambulance and two vans were donated for this purpose by Toyota Kirloskar Motors and Tata Motors. Through a grant from the SBI Foundation and with the identification of suitable partners for redesign, the interiors of these vehicles are being equipped with instrumentation required to convert them into mobile labs. After multiple iterations of the lab designs, workflows, SOPs and protocol



with inputs from several experts within IISc and outside, the final version of the designs and protocol are approved by ICMR. Soon after the successful deployment of the first unit in Karnataka, the project aims to scale the solution within and beyond the state by engaging with central and state governments, NGOs and other partners.

NCBS & JNCASR working on epidemiological modelling

Mukund Thattai, Sandeep Krishna, and Madan Rao of the National Centre for Biological Sciences-Tata Institute of Fundamental Research (NCBS-TIFR), in collaboration with Srikanth Sastry of Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), are working on mathematical models of the COVID-19 spread, including agent-based models and course-gained epidemiological models. These will be matched to national level quantitative data on COVID-19 spread to provide recommendations on outbreak suppressions. In addition, a team led by Upinder Bhalla and Sanjay Sane of NCBS is also working on an olfactory test for anosmia, which can identify clusters of potential COVID-19 and high-risk individuals.

The global pandemic COVID-19 has reached unprecedented international spread and cases are still being reported. Institutes with cutting-edge capabilities like NCBS and inStem will have a significant impact in responding to this crisis. The capacity of these institutes to contribute to the national response has been possible by donors who share their vision and want to work towards a common goal. Partners, such as Punjab National Bank (PNB), the Azim Premji Foundation, Standard Chartered Global Business Service, and the Nuclear Power Corporation of India Limited (NPCIL) are among those whose objectives of success include the well-being and health of the greater populace.

Please connect with Dr Sapna Poti (sapna.poti@gov.in) for further information on any of the industry engagement with S&T organisations.

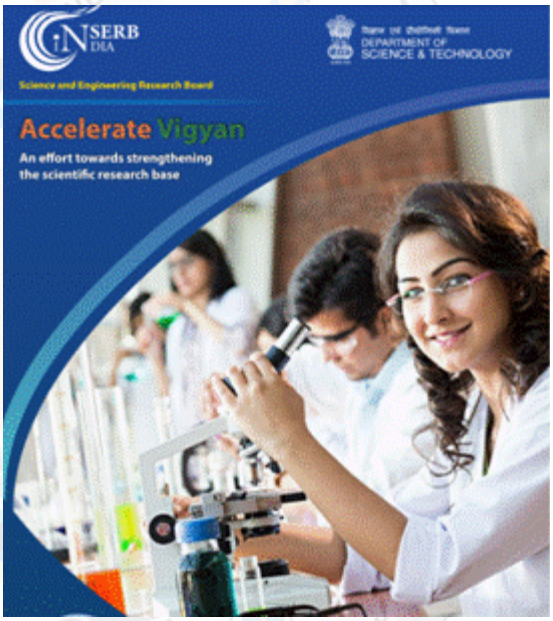
SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

DEPARTMENT OF SCIENCE AND TECHNOLOGY (DST)

Accelerate Vigyan, an inter-ministerial scheme, to strengthen scientific research mechanism

1st July 2020, New Delhi



To provide a single platform for research internships, capacity building programmes, and workshops across the country, the Science and Engineering Research Board (SERB) has launched a new scheme called 'Accelerate Vigyan' (AV). You can get more information on this scheme from its web portal www.acceleratevigyan.gov.in. Straight off the block, AV has already called for applications under its 'ABHYAAS' component for the Winter Season.

The primary objective of this inter-ministerial scheme is to give more thrust on encouraging high-end scientific research and preparing scientific manpower, which can lead to research careers and knowledge-based economy. Recognizing that all research has its base as development of quality and well-trained researchers, AV will initiate and strengthen mechanisms of identifying research potential, mentoring, training and hands-on workshop on a national scale.

"The vision is to expand the research base, with three broad goals, namely, consolidation / aggregation of all scientific programs, initiating high-end orientation workshops, and creating opportunities for research internships for those who do not have access to such resources / facilities," said Dr Rajeev Mehajan, Advisor, SERB. The institution is also planning to launch an app for this in the coming two months.

As for the 'ABHYAAS' programme, it is an attempt to boost research and development in the country by enabling and grooming potential PG/PhD students by means of developing their research skills in selected areas across different disciplines or fields. It has two components: High-End Workshops ('KARYASHALA') and Research Internships ('VRITIKA'). This is especially important for those researchers who have limited opportunities to access such learning capacities / facilities / infrastructure. The current call for applications invites researchers for the winter season (Dec 2020-Jan 2021) 'KARYASHALA' and 'VRITIKA'

"As part of this acceleration drive, there is a plan to organize about 1000 high-end workshops (dedicated to certain themes) to provide opportunities to about 25,000 postgraduate and doctoral students in the next five years, in collaboration with premier scientific institutions and laboratories," said Dr Mehajan. Also, central coordination of internships in these institutions will provide opportunity to another 1000 potential postgraduate students every year.

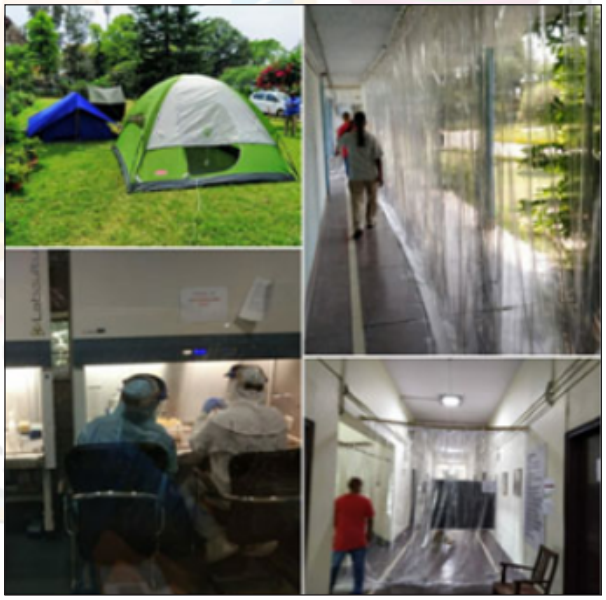
The AV will work on mission mode, particularly with respect to its component dealing with consolidation / aggregation of all major scientific events in the country. Thus, an Inter-Ministerial Overseeing Committee (IMOC) involving all the scientific ministries/departments and a few others has been constituted for the purpose of supporting SERB in implementing the AV scheme in a successful manner.

The database of skilled manpower developed across different disciplines so generated and the final outcomes captured in the process through all the sub-components of the AV will serve the cause of all stakeholders in respect of capacity building in the country. The scheme also seeks to garner the social responsibility of the scientific community in the country. In a nutshell, the AV platform is expected to be a game changer for developing career paths and providing support to catalogue the development of skilled man-power.

Another new component under AV is 'SAMMOHAN' that has been sub-divided into 'SAYONJIKA' and 'SANGOSHTI'. SAYONJIKA is an open-ended program to catalogue the capacity building activities in science and technology supported by all government funding agencies in the country. SANGOSHTI is a pre-existing program of SERB.

BSIP joins hands with Govt of UP to combat COVID-19 in the state

The Government of India, along with the State Governments, has been relentlessly working for prevention, containment, and management of COVID-19. Birbal Sahni Institute of Palaeosciences (BSIP), an autonomous institute under the DST, joined hands with the Government of Uttar Pradesh to combat COVID-19 in the state. BSIP, as one of the five Central Government Research Institutes in Lucknow, took initial steps to start laboratory testing of COVID-19.



Temporary sample collection point, temporary corridor and testing lab

The availability of the ancient DNA BSL-2A laboratory in the Institute itself made it possible to prepare for testing immediately.

BSIP received the first batch of suspected COVID-19 samples to test on 2nd May 2020 from district Chandauli. Since then, the lab is running 24 ´ 7 to test approximately 400 samples per day from various districts of Uttar Pradesh, as decided by the nodal authorities.

Website link:
https://dst.gov.in/bsip-joins-hands-govt-combat-covid-19-state

NATMO publishes 4th updated version of its COVID-19 Dashboard

National Atlas and Thematic Mapping Organization (NATMO) functioning as a subordinate department under the DST, Ministry of Science & Technology, Government of India published the 4th updated version of COVID-19 Dashboard on its official portal at http://geoportal.natmo.gov.in/Covid19/ on 19th June 2020.

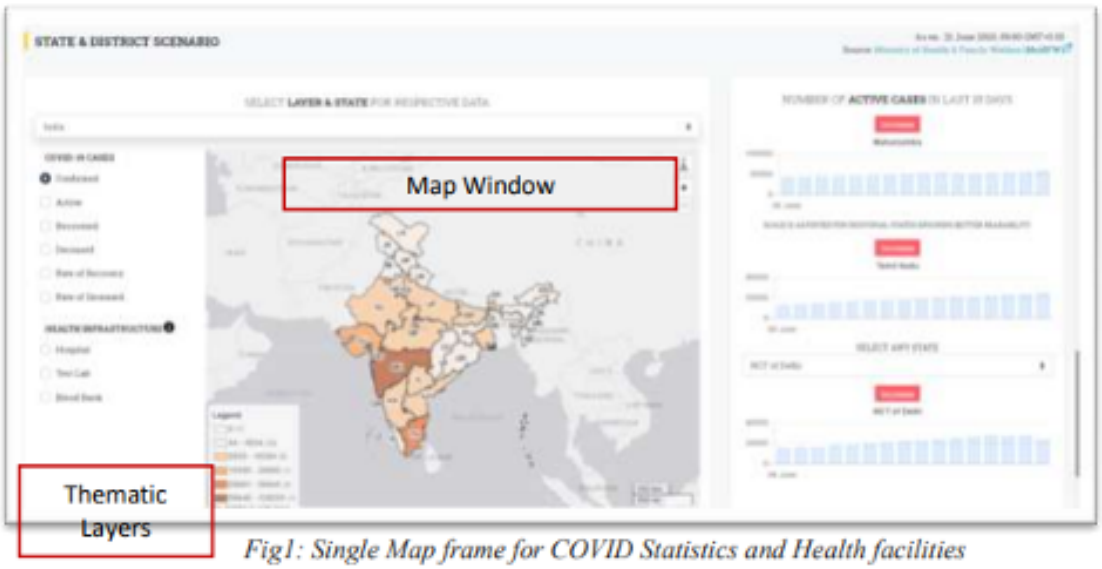


Fig1: Single Map frame for COVID Statistics and Health facilities

Website link:
https://dst.gov.in/sites/default/files/Report%20on%204th%20Update%20of%20COVID19%20Dashboard%20NATMO.pdf

Impactful S&T efforts initiated in last quarter

ChitraGeneLAMP-N makes confirmatory tests results of COVID 19 possible in 2 hours

Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram, an institute of national importance, of the DST, has developed a diagnostic test kit that can confirm COVID-19 in 2 hours at low cost.

The test kit, funded by the DST called ChitraGeneLAMP-N, is highly specific for SARS-CoV-2 N-gene and can detect two regions of the gene, which will ensure that the test does not fail even if one region of the viral gene undergoes mutation during its current spread.

Website link:
https://dst.gov.in/chitra-genelamp-n-makes-confirmatory-tests-results-covid-19-possible-2-hours

A predictive model by JNCASR can help prepare for medical needs for COVID-19

A team of researchers from Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institute under the DST, Government of India along with a collaborator from IISc Bengaluru have developed a heuristic predictive model for COVID-19 that provides short-term predictions about the evolution of the disease and the medical needs that are generated as a consequence.

The model focuses on the 'Achilles' heel' of COVID-19 response – medical inventory management. By providing key figures for medical inventories such as PPEs and ventilators, this model can significantly aid a systematic and meticulously-planned response to the pandemic. It will provide a full layout of the medical inventory needs, including intensive care, acute care, and medical supplies requirements, district-wise, for the coming weeks. It will also provide a pan-India overview of the development of the pandemic, with a state- and district-level insight into its progress.

Website link:
https://dst.gov.in/predictive-model-jncasr-can-help-prepare-medical-needs-covid-19

SCTIMST launched AgappeChitra Magna for detection of COVID-19

The commercial launch of AgappeChitra Magna, a magnetic nanoparticle-based RNA extraction kit for use during detection of COVID-19 was announced by Dr VK Saraswat, NITI Aayog member and President of Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) at a programme attended by Prof. Ashutosh Sharma, Secretary, DST, Government of India; Dr Asha Kishore, Director SCTIMST; and Dr HK Varma, Head Biomedical Technology and scientists of the Institute, through video conference.

The RNA extraction kit was developed by SCTIMST, Thiruvananthapuram, an Institute of national importance of the DST along with Agappe Diagnostics Ltd, an in-vitro diagnostics manufacturing company based in Cochin. "The commercial launch of the kit is a major step to make India self-reliant in detecting COVID-19 and can help increase the rate of testing and bring down its costs, a crucial step for combating the pandemic. It can also be an example of rapid commercialization and implementation of a state-of-the-art technology for the world to emulate," said Dr Saraswat while announcing the launch.

Website link:
https://dst.gov.in/sctimst-organize-commercial-launch-agappe-chitra-magna-detection-covid-19

SCTIMST scientists developed disinfection gateway & facemask disposal bin to fight COVID-19

Scientists at Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram, Kerala, an autonomous institute under the DST, Government of India, have designed two technologies to fight COVID-19 pandemic.

Chitra Disinfection Gateway is one of the two technologies designed by SCTIMST scientists Jithin Krishan and Subash VV

from the Division of Medical Instrumentation for the decontamination of people, one at a time. It is a portable system equipped with a system for generating Hydrogen peroxide mist and UV-based decontamination facility.

The second technology, Chitra UV-based Facemask Disposal Bin designed by Subash VV from SCTIMST, is a UV-based facemask disposal bin that can be used by health workers in hospitals and in public places where decontamination of used facemask, overhead covers, face shields, and so on are required to break the infection chain.

Website link:
https://dst.gov.in/sctimst-scientists-develop-disinfection-gateway-facemask-disposal-bin-fight-covid-19

CeNS uses electrostatics of materials to develop Tribo E mask to protect healthy individuals from COVID-19

Facemasks used by frontline healthcare professionals, which are of high technical quality, need specialised expertise for production. In contrast, a simple facemask that can contain the spread of the Coronavirus is advised for the general public.

Such a mask, though rudimentary in its action for containing the viral diffusion across the fabric layer, is expected to reduce the transmission of micro-droplets that linger in the air even during a simple conversation, let alone sneeze. Simple, often homemade, ones are advised for healthy individuals rather than those meant for health workers as there is a limited supply of the latter. If only the choice of the fabric can be made intelligently, the mask can serve the purpose more efficiently.

A team of researchers at the Centre for Nano and Soft Matter Sciences (CeNS), Bangalore, an autonomous institute of the DST, have come up with a recipe for making facemasks, termed as Tribo E Mask, that can hold electric charges to restrict the entry of infections but interestingly, without any external power.

The innovation by Dr. Pralay Santra, Dr. Ashutosh Singh, and Prof. Giridhar U. Kulkarni relies on electrostatics. When two non-conducting layers are rubbed against each other, the layers develop positive and negative charges instantly and continue to hold the charges for some time. They have used this electric field, quite strong at proximity, to deactivate or possibly even kill the germs.

The mask is three-layered – a layer of nylon cloth sandwiched between polypropylene layers, the latter sourced from commonly used non woven grocery bags. In place of nylon, silk fabric from an old saree or shawl may also be cut and used. When layers are rubbed against each other, the outer layers develop negative charges, while nylon will hold the positive charges. This will act as double electric wall protection against the infectious entities crossing. As the mask is made out of commonly available fabrics, it can be washed just like any other cloth and can

be reused. At this stage, the mask is, however, not recommended to healthcare professionals and patients.

Tribo E mask has polypropylene layers on the outside and nylon layer in between. When the layers are rubbed against each other, static electricity is produced, which is expected to restrict the possible transmission of infections.

Website link:
https://dst.gov.in/cens-uses-electrostatics-materials-develop-tribo-e-mask-protect-healthy-individuals-covid-19

UV disinfection trolley to effectively clean up hospital spaces for combating COVID-19

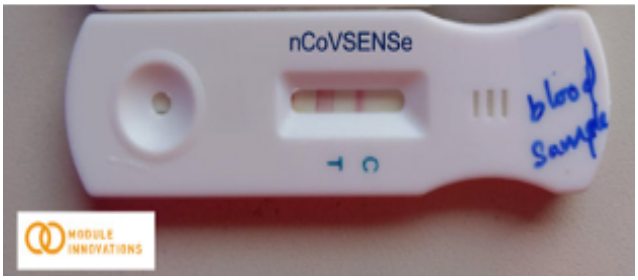
International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), an autonomous R&D Centre of the DST, Government of India and University of Hyderabad (UoH) together with the help of Mekins Industries Ltd. (MIL) have developed a UVC-based disinfection trolley to fight against COVID-19 by rapid cleaning of the hospital environment.

UV light in the range of wavelengths between 200 and 300 nm is capable of inactivating microorganisms, such as bacteria and viruses, thus disinfecting both the air and solid surfaces. Often, chemical disinfectants are not enough to remove the bacteria and viruses found in hospitals and other contamination-prone environment. Rapid decontamination of the used patient-care beds and hospital rooms before admission of subsequent occupants is a significant requirement in hospitals because of the limited availability of beds. Coronavirus is sensitive to UVC light, as in the case of other viruses and bacteria. The germicidal effects of UVC irradiation with a peak intensity at 254 nm results in cellular damage of the virus, thereby inhibiting cellular replication. Unlike chemical approaches to disinfection, UV light provides rapid, effective inactivation of microorganisms through a physical process.

Website link:
https://dst.gov.in/uv-disinfection-trolley-can-effectively-clean-hospital-spaces-combat-covid-19

DST-supported healthcare start-up developing rapid test for detection of COVID-19

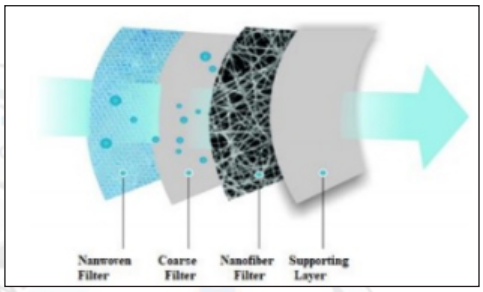
The DST has funded Module Innovations, a Pune-based healthcare start-up working on the point-of-care diagnostics to develop its platform technology for rapid diagnosis of diseases to develop a test kit for detecting COVID-19 within 10 to 15 minutes.



Using the proven concept from its flagship product 'USense', the start-up is now developing nCoVSENSEs™ which is a rapid test device for detection of antibodies that have been generated against the COVID-19 in the human body.

Website link:
https://dst.gov.in/dst-supported-healthcare-startup-developing-rapid-test-detection-covid-19

DST supports development of reusable N95 & N99 mask with enhanced antiviral efficiency



The DST has approved support for development and upscaling of reusable N95 and N99 masks with enhanced antiviral and antibacterial property designed by Dr Sri Sivakumar from Indian Institute of Technology, Kanpur under the Nano Mission.

The masks will be made of nanofibers developed from polymers (e.g., chitosan, polycaprolactone, polyethylene terephthalate, polypropylene). They will have inorganic antiviral or bacterial nanoparticles as well as organic antiviral and bacterial molecules. The nanofiber-based masks will have four layers of construction and filtration size would be 0.01 to 0.3 micro meters.

N95 and N99 are classified as an antipollution face mask, which possesses 95% and 99% filtration efficiency of 0.3-micron particulate matter, respectively. However, these masks fail to protect a person from the particle size lesser than 0.3 microns. To achieve higher filtration efficiency between the range of 0.01-0.3 micron particulate matter (e.g., Coronavirus, bacteria and other pollutants), the mask has to be designed with finer pore size.

Contact Info: Dr. Sri Sivakumar; srisiva@iitk.ac.in

Website link:
https://dst.gov.in/dst-supports-development-reusable-n95-n99-mask-enhanced-antiviral-efficiency

Study to identify biomarkers to predict progression from non-severe to severe COVID-19 cases can help interventions

The Science and Engineering Research Board (SERB), a statutory body under the DST, will support the exploration of metabolomics alteration in COVID-19-infected patients conducted by IIT Bombay in collaboration with some hospitals in Mumbai.

Dr Sanjeeva Srivastava, Dr Mala Vinod Kaneria and Dr Jayanthi S. Shastri (in picture from left to right)

The study will identify potential biomarker candidates to predict progression from non-severe to severe COVID-19 conditions. Search for potential diagnostic candidates will involve metabolite profiling of different patient groups with various complications. Metabolites are small biomolecules, capable of regulating multiple pathways in all the living-organisms.

Dr Sanjeeva Srivastava, Professor at IIT Bombay, with the expertise of using state-of-the-art mass spectrometry-

based technologies, has teamed up with Dr Om Shrivastav, Director, Infectious Diseases, Jaslok Hospital, Mumbai and Dr Jayanthi S. Shastri, Professor & Head (Microbiology) T N Medical College & Nair Hospital and Dr Mala Vinod Kaneria, Infectious Disease Specialist at Kasturba, Nair & Jaslok Hospitals, for this research.

Website link:
https://dst.gov.in/study-identify-biomarkers-predict-progression-non-severe-severe-covid-19-cases-can-help

ARCI & Mekins develop UVC-based multipurpose disinfection cabinet for containing surface contamination of COVID-19

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), an autonomous R&D Centre of DST, Government of India and MEKINS Industries have codeveloped a UVC-based cabinet for disinfecting non-critical hospital items, laboratory wear, and PPEs in the research laboratories to prevent surface contamination of COVID-19.

It can also be used to disinfect items exhibited to customers in commercial establishments and several domestic items.

This compact UVC disinfection cabinet consists of 4 UVC lamps of 30W (on sides) and 2 lamps of 15 W (top and bottom). It gives a flux sufficient to disinfect articles of various dimensions placed in shelves separated by metal grilled frames to allow sufficient light from all sides. For the safety consideration and to avoid direct exposure of UVC light to the user, the lamps switch on only when the door is locked. The irradiance intensity is measured at various points within the box to assure sufficient radiation to disinfect all the placed articles within 10 minutes. The partition frames in the cabinet are removable so that even bigger objects like lab coats, blazers, suits can be disinfected when required. The UVC cabinet is multifunctional and very promising for establishments including research and academic institutes, corporate offices, hospitals, clinics, nursing homes, hotels, restaurants, commercial outlets and domestic usage for fighting COVID-19.

Website link:
https://dst.gov.in/arci-mekins-develop-uvc-based-multipurpose-disinfection-cabinet-containing-surface-contamination

DST initiates COVID-19 India National Supermodel for monitoring infection transmission & aid decision-making by policymakers

The DST has initiated a COVID-19 Indian National Supermodel to help monitor the future transmission of infection, thus aiding decisions involving health system readiness and other mitigation measures.

While the Government is keeping a close watch on infectivity and mortality, it is imperative to bring in a robust forecasting model for predicting the spread and enhancing disease surveillance.

Numerous mathematical models for COVID-19 forecasting and surveillance are being worked out by investigators funded by DST-SERB (Science and Engineering Research Board) and other agencies.

Inspired by India's history of using mathematical models for disaster management planning of metrological events, DST has initiated this exercise to pool in expertise in the field and create one model for the entire country that will be subjected to rigorous tests required for evidence-based forecasting, routinely practiced in weather forecasting communities.

Website link:
https://dst.gov.in/dst-initiates-covid-19-india-national-supermodel-monitoring-infection-transmission-aid-decision

DST sets up rapid response centre at SINE, IIT Bombay to combat COVID-19

The DST, Government of India in a quick response to combat COVID-19 global pandemic approved setting up of a Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH) at a total cost of Rs. 56 Cr to scout, evaluate and support the innovations and start-ups that address COVID-19 challenges.

The Society for Innovation and Entrepreneurship (SINE), a technology business incubator at IIT Bombay supported by DST has been identified as the Implementing Agency of the CAWACH. CAWACH will identify up to 50 innovations and start-ups that are in the area of a novel, low cost, safe and effective ventilators, respiratory aids, protective gears, novel solutions for sanitizers, disinfectants, diagnostics, therapeutics, informatics and any effective interventions to control COVID-19.

Website link:
https://dst.gov.in/dst-sets-rapid-response-centre-sine-iit-bombay-combat-covid-19

DST launches nationwide exercise to map & boost COVID-19 solutions with R&D, seed & scale up support

Rising to the national call to combat the public health crisis arising out of COVID-19 pandemic, the DST is synergising and consolidating the various activities carried out by the Ministry of S&T and its network of autonomous institutions and scientific bodies across the country.

The solutions and novel applications to address COVID-19 pandemic-related challenges are being taken up through a three-pronged approach. These include (a) extensive mapping of solutions requiring R&D support, start-ups with viable products requiring facilitation and manufacturing support; (b) identification of market-deployable products requiring seed support and (c) support for solutions already in market but require substantial scale up to augment their manufacturing infrastructure and capabilities.

The Science & Engineering Research Board (SERB), an autonomous institution of the DST has already sent out a call to invite proposals as part of special call under IRHPA (Intensification of Research in High Priority Area) scheme specifically designed for COVID-19 and related respiratory viral infections to ramp up national R&D efforts for new anti-virals, vaccines and affordable diagnostic. The call which invited submissions by March 31, 2020 has garnered encouraging response from scientists across India.

Website link:
https://dst.gov.in/dst-launches-nationwide-exercise-map-boost-covid19-solutions-rd-seed-scale-support

DBT-ILS study may help use of Syrian golden hamster for COVID-19 research

Hamsters are rodents belonging to the subfamily Cricetinae, which contains 19 species classified in seven genera. They have become established as popular small house pets. The best-known species of hamster is the golden or Syrian hamster. It is the type most commonly kept as pets. It has also been demonstrated as a clinically relevant animal model for SARS-CoV-2 infection. However, lack of appropriate information regarding tissue-specific expression patterns of various proteins in these animals and non-availability of reagents like antibodies against this species is a major obstacle in doing research with them.

A research group at the DBT's Institute of Life Sciences (DBT-ILS) led by Dr Shantibhusan Senapati has conducted a study to analyze the tissue-specific expression pattern of angiotensin-converting enzyme 2 (ACE2), a proven functional receptor for SARS-CoV-2 in different organs of the hamster. They involved techniques like immunoblot analysis, immunohistochemistry, and immunofluorescence analysis to evaluate the ACE2 expression pattern in different tissues of the animal.

The research team observed that the kidney, small intestine, esophagus, tongue, brain, and liver express ACE2. Epithelium of proximal tubules of kidney and surface epithelium of ileum expresses a very high amount of this protein. Surprisingly, analysis of stained tissue sections for ACE2 showed no detectable expression of ACE2 in the lung or tracheal epithelial cells. Similarly, all parts of the large intestine (caecum, colon, and rectum) were negative for ACE2 expression. Although some of these findings support earlier reports related to ACE2 expression patterns in human tissues, some also contradicts already reported findings. However, the findings of this study will definitely enable the appropriate use of the Syrian golden hamster to carry out SARS-CoV-2-related studies.

Contact Info: Dr Shantibhusan Senapati, Dr Mamoni Dash; mamonidash@gmail.com

Website link:

https://www.biorxiv.org/content/10.1101/2020.06.29.177154v1

https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_03S_6July2020.pdf

DBT-inStem holds Sundowner Session on 'News Fatigue'

The DBT's Institute for Stem Cell Science and Regenerative Medicine (DBT-inStem) is one of the founding partners of COVID Gyan, a pan-institutional website that has been proactive in COVID-19 outreach efforts. The Institute has been conducting Sundowner Sessions since lockdown 1.0 in collaboration with Bangalore Life Science Cluster (BLiSc) every week focusing on various topics relevant to the socio-economic crisis caused by the pandemic.

A session held on June 26, 2020, focused on 'News Fatigue' a phenomenon of being overwhelmed by the deluge of information on different aspects of the viral spread. Dr. Karishma Kaushik from Pune University, Prof. Krishnaveni Mishra from University of Hyderabad and Prof. Vinod Vidwans from FLAME University were the panellists. They addressed questions like what is news fatigue, does it arise from actual information or the manner of reporting on TV, digital and social media platforms, how can one avoid news fatigue, trusting one news source which provides reliable information etc. during the 50 minutes' session.

They also focussed on how to stay informed and live with the pandemic-related news moving forward and possible policy of self-isolating from the media if it is harming one's mental health. A recording of the session will be available on the YouTube channel of COVID Gyan soon.

Contact Info: Amrita Tripathy; tripathya@instem.res.in

Website link:
https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_02S_6July2020.pdf

DBT-supported programme helps set up COVID-19 testing lab in Aizawl

The Mizoram Government has set up a COVID-19 testing lab at Zoram Medical College in Aizawl. The faculty and research scholars involved in the DBT-sponsored Biotech Hubs in Mizoram played an important role in providing infrastructure and other support for this endeavour.

Biotech Hub coordinators and research scholars from Mizoram University (MZU), Pachhunga University College (PUC), Regional Institute of Paramedical and Nursing Sciences (RIPANS) and Central Agricultural University (CAU) also offered technical support by holding demonstration

and training to the Medical College faculty and staff on how to use the COVID-19 test kit obtained from ICMR, New Delhi.

The four Biotech Hubs had transported the ABI Real-Time PCR, BioRAD RT-PCR and Roche RT-PCR machines, micropipettes, hot bath, and other minor equipments and consumables for use in the COVID-19 testing laboratory at the Medical College.

Mizoram University has also set up a Molecular Biology research lab at Zoram Medical College through the DBT-North East Region MDR-TB project; and its facilities - autoclave, cooling centrifuge, deep freezer, consumables and glassware are also used by the Zoram Medical College for the COVID-19 testing.

So far, the Zoram Medical College has tested more than 12,000 suspected samples and is conducting tests routinely. Now, during the movement of stranded people into the Mizoram state, more than 1000 samples are tested per day. Earlier, the samples from Mizoram were sent to Guwahati Medical College and Silchar Medical College for testing.

Contact Info: Dr. N. Senthil Kumar; nskmzu@gmail.com

Website link:
http://dbtindia.gov.in/schemes-programmes/promoting-biotechnology-north-east-region/about-ner-programme-ner-bpmc

https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01S_6July2020.pdf

Catheter reprocessing system for reprocessing of medical devices

To overcome the manual reprocessing of medical devices, the Catheter Reprocessing System (CRS) by Incredible Devices Pvt. Ltd supported by DBT's Biotechnology Industry Research Assistance Council (BIRAC) ensures safe reprocessing of catheters and a variety of essential medical devices. The CRS is an automated system that safely reprocesses medical devices with minimal human intervention thereby ensuring safety of doctors and patients. CRS shall help meet the demand for limited medical devices. It is a patented technology and reduces the generation of biomedical waste by 90%.

CRS also provides a cost-effective clinically proven, fail-safe way to disinfect catheter waste, at point of the source itself which helps to avoid viral outbreak due to accidental pilferage of biomedical waste. Additionally, CRS promotes safe reuse, reduces carbon footprints and saves water. It is currently priced at Rs. 5-10 lakhs per unit and comes in multiple variants. The cost varies depending upon capacity and features.

Shortage of medical devices at hospitals may happen due to lack of imports and logistics issues impacting manufacturing supply chains worldwide. Manual reprocessing of medical devices

shall lead to a higher rate of spread of infections, risking both patients and hospital staff. This is of great consequence in the current COVID-19 pandemic.

Contact Info: Dr Shirshendu Mukherjee mdpmubmgf@birac.nic.in; Dr Hafsa Ahmad, nbm9@birac.nic.in; Ms Ginny Bansal, pmubmgf6@birac.nic.in

Website link:
https://www.birac.nic.in/

NemocareRaksha Plus: A potential COVID-19 solution

The world is struck by the COVID-19 pandemic and the number of positive cases is increasing every day across the globe. Hospitals are severely challenged by limited resources. The healthcare workers are most at the risk of contracting the infection. In such a sensitive situation, DBT-Biotechnology Industry Research Assistance Council (BIRAC) supported start-up Nemocare Wellness Pvt. Ltd. has stepped forward with an innovation called NemocareRaksha Plus which has come up with a wearable device for remote monitoring of health parameters of confirmed positive cases.

This continuous monitoring wearable device will aid in remote monitoring of vitals along with geolocation and prognosis of affected and quarantined patients. It will also aid in tracking their symptoms and the doctors will be alerted on detection of deterioration. The parameters that the system can measure are

- Heart Rate;
- SpO_2;
- Respiration Rate;
- Body Temperature;
- Heart Rate variability;
- Cough Sounds; and
- Geolocation of the subject.

The clinician/public health specialist can check the dashboard to study the remote monitoring of vitals of diagnosed/suspected cases of having COVID-19 and track symptoms using trends analysis. This BIRAC-supported innovation can potentially assist in the management of COVID-19.

Contact Info: Dr. Shirshendu Mukherjee mdpmubmgf@birac.nic.in; Dr Hafsa Ahmad, nbm9@birac.nic.in; Ms Ginny Bansal, pmubmgf6@birac.nic.in

Website link:
https://www.birac.nic.in/

DBT-IBSD continues distribution of PPEs to frontline workers

The DBT's Institute of Bioresources and Sustainable Development (IBSD), Shillong Centre distributed institute-made facemasks to security personnel and vendors in the local vegetable market at 6th Mile, Upper Shillong.

Evening daily

Imphal Times

Regd.No. MANENG /2013/51092 Volume 7, Issue 313, Thursday, June 25, 2020 *Mathyapham Pukcha kumaing 5418*

IBSD Sikkim Centre distributes hand sanitizers

IT News
Gangtok, June 25:

Institute of Bioresources and Sustainable Development (IBSD), Sikkim Centre, Tadong have handed over locally made hand sanitizers as per guidelines of World Health Organization, to Traffic Police and Police Head Quarters, Gangtok today.

The initiative of free distribution of the above items was taken up under the guidance of Director of the institute, Prof. Pulok K Mukherjee. The distribution was made in view of the shortage of supply and high cost of hand sanitizers in the market area.

Institute of Bioresources and Sustainable Development (IBSD), Sikkim Centre has been distributing hand sanitizers to frontline workers to fight the COVID-19 pandemic and is ready to help in the future to fight the pandemic. This is in continuation in the effort of distribution of hand sanitizer and surface disinfectant to frontline workers of Sikkim and providing help to STNM in the form of consumables for COVID testing.

The initiative was taken up under the guidance of the Director, Prof. Pulok K Mukherjee, with an objective to prevent the spread of COVID-19 among and through local vendors. Similar initiatives were also carried at IBSD centres at Imphal, Gangtok and Aizawl.

Contact Info: Prof. Pulok Kumar Mukherjee; director.ibsd@nic.in

Website link:
http://theshillongtimes.com/2020/06/27/meghalaya-nuggets-108/

Mobile I-Lab flagged off at THSTI for COVID-19 testing in Faridabad

Infectious Disease Diagnostic Lab (I-LAB), a mobile lab unit for COVID-19 testing, was flagged off at DBT's Translational Health Science and Technology Institute (THSTI), Faridabad. The event was attended by the Deputy Commissioner and District Magistrate, Faridabad and Commissioner, Municipal Corporation Faridabad. This unit would be used for COVID-19 testing by THSTI in Faridabad and its adjoining areas.

The Union Minister of Health, Dr Harsh Vardhan launched India's first mobile I-LAB (Infectious Disease Diagnostic Lab) on 18th June 2020. The goal is to improve the last mile testing access for COVID-19 testing. I-LAB is being deployed in the remote, interior, and inaccessible parts of the country and can perform 25 COVID-19 RT-PCR tests per day; 300 ELISA tests per day; and additional tests for TB, HIV, and others as per CGHS rates. The I-LAB is supported by the DBT, Ministry of Science & Technology, under the COVID Command strategy.

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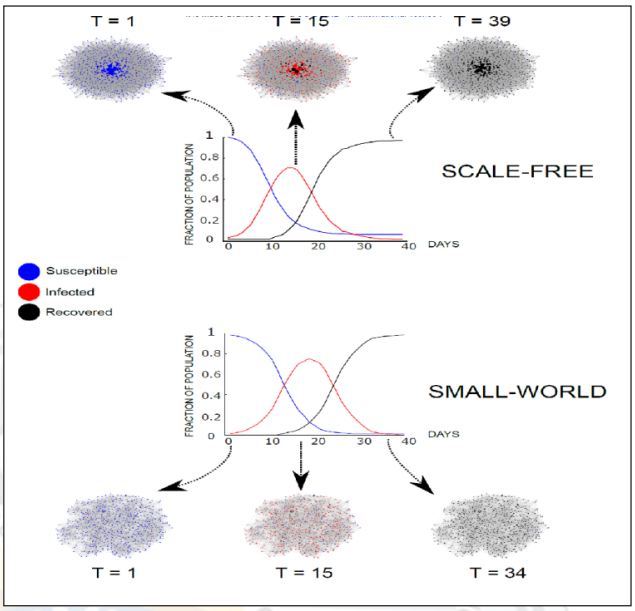
Website link:
https://thsti.res.in/

Epidemiological model to study the lockdown efficacy of spreading the infectious diseases



Team of researchers at DBT's National Brain Research Centre (NBRC), Manesar sought to simulate lockdown scenarios using an Agent-Based Modelling (ABM) strategy, which is a new modelling paradigm that seeks to simulate the actions and interactions of autonomous agents within an environment. The spread of infectious viral diseases occur over a connected social network. Specifically, the goal was to understand the effect of network topology and lockdown strategies on disease spreading dynamics.

To explore the effect of topology, the team assumed the social network over which the disease spreads to have small-world or scale-free properties characterized by a rewiring probability and degree distribution, respectively. Lockdowns were simulated as intervention strategies that modified the spreading dynamics of infection over a given graph structure through changes in properties of agent interaction. Lockdown efficacy was assessed by the maximum number of infections recorded during a simulation run. Thereafter, lockdown efficacy was evaluated as a function of lockdown start times and duration. Thus, the team proposed that ABM approach can assess the various lockdown strategies that aim to prevent breakdown of medical infrastructure while accounting for realistic social network configurations specific to a local population.

Contact Info: Dr Arpan Banerjee; arpan@nbrc.ac.in

Website link:
https://www.medrxiv.org/content/10.1101/2020.06.22.20137828v1

Impactful S&T efforts initiated in last quarter

DBT – AMTZ Mobile Diagnostic Unit for COVID-19 Testing - I-Lab

The Minister for Science & Technology, Earth Sciences and Health & Family Welfare Dr Harsh Vardhan inaugurated and flagged off India's first I-Lab (Infectious disease diagnostic lab) for COVID-19 testing in rural and inaccessible areas of India. Secretary, Department of Biotechnology Dr Renu Swarup and other officials were present on the occasion. Dr Jitendar Sharma, CEO, Andhra Med Tech Zone CEO and senior officials from NITI Aayog, Ministry of Health & Family Welfare, MeiTY, other ministries, ICMR, DST, CSIR etc. joined the function through web online.

Expressing his happiness to launch the I-Lab, a mobile testing facility, Dr Harsh Vardhan dedicated this to provide COVID-19 testing access to rural India. This mobile testing facility will be deployed through the DBT testing hubs to remote regions of the country for COVID-19 testing. He congratulated and appreciated the efforts of the DBT in tackling the pandemic and

added that DBT coordinated in scaling-up testing for COVID-19 by reorienting premiere laboratories as COVID-19 testing centres in a hub-and-spoke model. There are now over 20 hubs in the country with 100 testing laboratories and these have tested more than 2,60,000 samples.

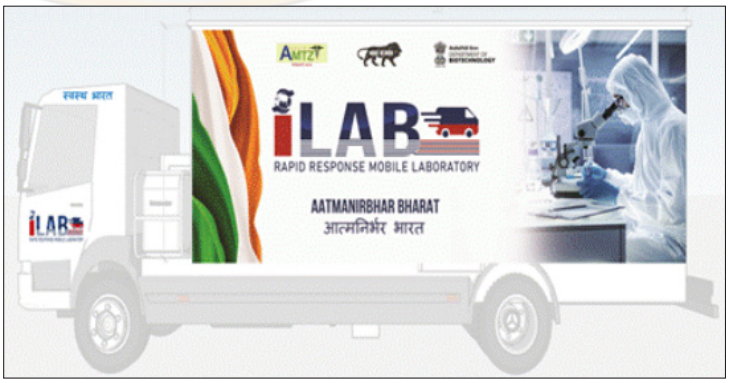
Dr Harsh Vardhan said, "This has been possible through the DBT-AMTZ COVID Command Consortia (COVID Medtech Manufacturing Development Consortia) to cope with the current situation in the country and move progressively towards a stage of self-sufficiency. The I-lab will be deployed through these hubs into remote and interior places." The Minister appreciated the "Andhra med-tech zone team for building this unique, innovative facility for the country at the period of lockdown through tireless, dedicated and committed efforts." He informed that AMTZ through the support of DBT has also established manufacturing facility for indigenous manufacturing of kits and reagents for various testing kits which were initially imported thereby helping us realise the vision of Pradhan Mantriji on 'Make-in India', 'Make for India'. He pointed out that today there are 953 testing laboratories in all corners of the country and elaborated on "Various steps taken by the ministry and departments towards achieving research components indigenization and their in-house manufacturing." Dr Harsh Vardhan emphasised that "In the near future with all these collective and cooperative efforts, India will achieve self-sufficiency in healthcare technologies leading towards Atmanirbhar Bharat."

Dr Renu Swarup said on the occasion that through the concerted efforts of the Indian scientists, the country has achieved a capacity of producing nearly 5 lakh testing kits per day, exceeding the target of having one lakh test kits by May 31, 2020. She pointed out that this I-Lab has been created in a record time of 8 days by the Andhra Pradesh Med-tech Zone team with the support of DBT under the National Biopharma Mission being implemented by the Public Sector BIRAC. She highlighted that the unit has biosafety facility and is capable of performing RT-PCR as well as ELISA tests.

DBT-AMTZ COMManD

The Department of Biotechnology (DBT), Ministry of Science & Technology along with Andhra Pradesh Med-tech Zone (AMTZ) has initiated the DBT-AMTZ COMManD [COVID Medtech Manufacturing Development] Consortia to address the shortage of critical healthcare technologies in India and move progressively towards a stage of self-sufficiency.

Under this Consortia, India's first I-Lab has been built at AMTZ in record time of 8 days from the date of receipt of Automotive Chassis from Bharat Benz. This is a mobile diagnostic unit with biosafety facility. The I-Lab is a BSL-2 facility with on-site ELISA, RT-PCR, Bio chemistry analysers. It can run 50 RT-PCR reactions



and about 200 ELISA in a day. Double set of machines can help increase the capacity to about 500 per day in 8 hours shift.

It can be deployed in remote areas and can be lifted from automotive chassis and can be put on goods train for sending to any location in the country. The BSL-2 Lab is as per NABL specifications and is being attached to DBT's certified testing centres.

The Department of Biotechnology (DBT), under the Ministry of Science & Technology, promotes and accelerates the development of biotechnology in India, including growth and application of biotechnology in the areas of agriculture, healthcare, animal sciences, environment and industry.

AMTZ is Asia's first medical equipment manufacturing ecosystem, uniquely dedicated for Medtech and supported by various Ministries.

INFECTIOUS DISEASE DIAGNOSTIC LABORATORY (I-LAB)

To promote last-mile access of testing to rural India, DBT under the COVID-Command strategy has supported building of mobile testing labs through AMTZ.
The unique feature of these mobile testing labs is their utility in diagnosing other infectious diseases beyond the COVID period.

Specifications

- Automotive Chassis, Diagnostic Equipment, Clean Room, BSL-2 lab, bio-safety cabinets;
- 25 Tests (RT-PCR) per I-Lab per day;
- 300 ELISA tests per day; and
- Costs of additional test for other diseases for TB, HIV etc. to be as per CGHS rates.

Deployment

- The first I-Lab was launched in New Delhi on 18th June, 2020 by Dr Harsh Vardhan, Minister for Science & Technology, Earth Sciences and Health & Family Welfare.
- The Labs will be provided to the regional/city hubs and they will deploy it further in the interior, inaccessible parts of the region.

THE COUNTRY WILL BE SELF RELIANT BY THE END OF MAY 2020 IN PRODUCING INDIGENOUS RAPID TEST AND RT-PCR DIAGNOSTIC KITS

"At least half a dozen candidate vaccines are being supported of which four are in an advance stage."

- Dr Harsh Vardhan

Date: 28th April, 2020

Union Minister of Science & Technology, Health & Family Welfare and Earth Sciences, Dr Harsh Vardhan reviewed through video-conferencing the various initiatives undertaken by the Department of Biotechnology (DBT) and its Autonomous Institutes (AIs) and Public Sector

Undertakings (PSUs) – BIRAC and BIBCOL to tackle the current COVID-19 crisis, especially with respect to progress made in indigenous development of vaccine, Rapid Test and RT-PCR diagnostic Kits.

Secretary, DBT, Dr Renu Swarup informed that DBT has evolved a multi-pronged research strategy and action plan for immediate response as well as for long-term preparedness to tackle COVID-19. These multifaceted efforts include research towards development of candidate vaccines, therapeutics, and suitable animal models for COVID-19 as well as development of indigenous diagnostics and genomic studies on the host and pathogen. The DBT and its PSU, Biotechnology Industry Research Assistance Council (BIRAC) has announced a COVID-19 Research Consortium Call to support diagnostics, vaccines, novel therapeutics, repurposing of drugs or any other intervention for control of COVID-19.

During interaction with DBT scientists, the Union Minister was informed about various computational methods being developed by DBT labs/AIs to predict potential antiviral drug molecules. In another strategy, surrogates of the virus are being developed representing one or more critical steps in virus lifecycle and inhibitors are being tested. Work is in progress to isolate neutralizing antibodies either from the patients recovered from COVID-19 or from human antibody libraries. Also, various AIs of the DBT are working on development of candidate vaccines which are at various stages of pre-clinical studies with an overall aim to demonstrate the proof of concept and immunogenicity and safety evaluation prior to clinical testing. At the moment, at least 9 of these studies are in early stages and one delivery and adjuvant system for improving the immunogenicity of candidate vaccine is at the advanced stage of development.

While discussing genetic sequencing, Dr Harsh Vardhan said, "These genetic sequencing efforts remind me of Polio eradication movement 26 years back. Towards the fag end of the Polio movement, active surveillance of the country was done to find out the cases of acute flaccid paralysis. That time also, genetic sequencing was used to establish the travel history of polio virus which eventually helped in the eradication of polio."

After the presentation, Dr Harsh Vardhan appreciated the work being done by the scientists and their innovative ways of finding solutions to mitigate COVID-19. "The sincere efforts of DBT scientists will enable the country to be self-reliant in production of RT PCR and Antibody test kits by the end of next month. This will make it possible to meet the target of conducting one lakh tests per day by the end of next month," he said. He also exhorted scientists working

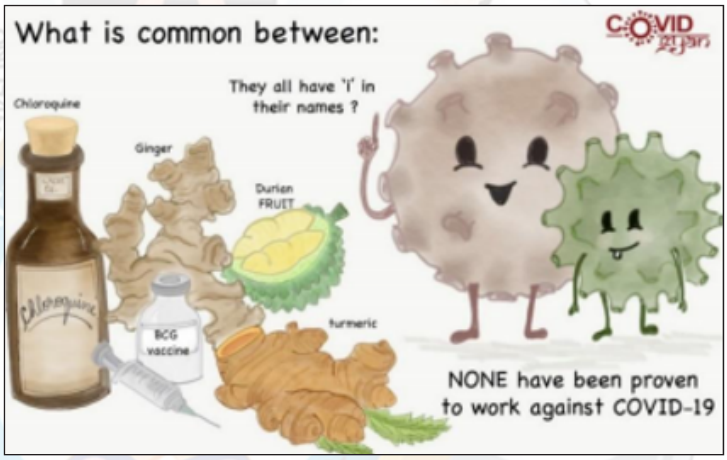
on developing new vaccines, new drugs and medical equipment to speed up their work. "Out of at least half a dozen candidates supported for vaccines, four are in an advanced stage and regulatory platform at one place has been constituted for speedy clearances," he said.

Dr Harsh Vardhan also appreciated the BIRAC efforts in supporting over 150 start-up solutions of which over 20 are ready for deployment. He also released a hand sanitizer developed by another PSU of DBT, Bharat Immunologicals and Biologicals Corporation Ltd. (BIBCOL) which is engaged in manufacturing of various biological, pharmaceutical and food products. It is currently manufacturing formulations of Vitamin C and Zinc tablets to contribute towards the solutions for COVID-19. "A contribution of Rupee One towards commercial sale of each single bottle of this Sanitizer will go to PM Cares Fund," Dr Harsh Vardhan said.

Dr Renu Swarup, Secretary, DBT, senior officials, Directors of DBT-AIs, Senior Scientists and senior officials from BIRAC and BIBCOL participated in the meeting.

Art Work to demystify COVID-19

An artwork has been prepared by Michelle Ninochka D'Souza, a PhD student in the DBT's Institute for Stem Cell Science & Regenerative Medicine (inStem) on COVID-19. D'Souza is part of Ravi Muddashetty's lab at the Centre for Neurodevelopmental Synaptopathies(CNS) in the Institute.



DBT-inStem is one of the founding partners of COVID Gyan, a pan-institutional website that has been proactive in COVID-19 outreach efforts. One of the many efforts of COVID Gyan website is weeding out myths. Infographics and artworks play a significant role in this pursuit.

Website link:
https://covid-gyan.in/infographics

IBSD teams up with Meghalaya Government for establishing COVID-19 testing at Tura, Shillong

In an effort to establish a COVID-19 diagnostics facility at Tura, Shillong, the DBT's autonomous centre, the Institute of Bioresources and Sustainable Development (IBSD), Imphal has provided an RT-PCR machine, a refrigerated centrifuge and two deep freezers along with technical support and orientation for use of such equipment. The equipments have been handed over to the state team of doctors and laboratory technicians, who have also been trained to handle the equipments meant for COVID-19 testing at the Microbiology Department of North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGHRIHMS).

The Tura facility is being made at Government Civil Hospital and it has come about by online and virtual co-ordination between the teams of Commissioner and Secretary, Health, Government of Meghalaya and the Director IBSD. Dr Albert Chiang, Scientist at IBSD, is coordinating with the Meghalaya Heath Department in this matter. IBSD shared the essential equipment in the

earlier interim period to rapidly fill up the gap brought about by the global supply chain crisis of equipment and consumables during COVID-19 pandemic and the subsequent lockdown. Prof. Pulok K Mukherjee, Director IBSD, has extended his appreciation to the Meghalaya Heath Department for working tirelessly in their battle against COVID-19 and also assured full support from IBSD to the State for any other scientific endeavours in this current COVID-19 crisis. The DBT's IBSD has been working with the Meghalaya Health Department to setup this COVID-19 diagnostics facility at Tura, which is more than 300 km from NEIGRIHMS, Shillong, presently the lone COVID-19 testing centre of Meghalaya.

In similar efforts, IBSD has been providing both equipment and consumables support to several COVID-19 testing facilities across the North eastern region, such as JNIMS, Government of Manipur; RIMS, Imphal, Government of India; NEIGHRIHMS, Shillong, Government of India; Zoram Medical College, Government of Mizoram and Pasteur Institute, Government of Meghalaya.

Website Link:
https://www.sentinelassam.com/meghalaya-news/ibsd-assisting-meghalaya-to-set-up-covid-testingfacility-in-tura-472106

https://theoptimist.news/dbt-ibsd-teams-up-with-meghalaya-government-for-covid-19-testing/

https://vigyanprasar.gov.in/vigyan-samachar/

A consortium launched for innovations in biomedical resources to fight COVID-19

The DBT has launched a new consortium in a public-private partnership model to foster the development of indigenous innovations in reagents and other resources for diagnostics, vaccines and therapeutics for COVID-19.

The new setup called National Biomedical Resource Indigenization Consortium (NBRIC) has been established in partnership with Association of Biotechnology Led Enterprises (ABLE) and Confederation of Indian Industry (CII). It is being hosted by DBT's Bengaluru-based Centre for Cellular and Molecular Platforms (C-CAMP).

To start with, NBRIC is announcing an initiative for mapping of reagents and consumables for COVID-19 RT-PCR testing kits.

Website link:
https://bit.ly/2VcRnGl

DBT-BIRAC clear 70 proposals for vaccines, diagnostics, therapeutics and other products

The DBT and its public sector enterprise Biotechnology Industry Research Assistance Council (BIRAC) had invited applications for funding under a COVID-19 Research Consortium to help develop safe and effective biomedical solutions against SARS-CoV-2 as quickly as possible. The two organisations have continuously been evaluating the applications. These applications were called from the industry and academia, both separately and jointly, for developing diagnostics, vaccines, novel therapeutics, repurposing of drugs or any other intervention that may be of use to control the pandemic.

Through a rolling multi-tiered review mechanism, 70 proposals of devices, diagnostics, vaccine candidates, therapeutics and other interventions have been recommended for receiving financial support. The shortlisted proposals include 10 vaccines candidates, 34 diagnostics products or scale-up facilities, 10 therapeutics options, two proposals on drug repurposing and 14 projects for preventive interventions.

To accelerate vaccine development, DBT has identified some institutes which will provide animal models for testing pre-clinical efficacy and also make available neutralization assays. IIT Indore will produce Pseudovirus SARS-CoV-2 which can be used for development of in-vitro assays. Enzene Biosciences Limited will make available Spike protein and Receptor Binding Domain protein in large quantities to vaccine and diagnostic companies as a reagent.

The portfolio of vaccine candidates has been enhanced by providing support for development of a next-generation mRNA vaccine candidate by Gennova and to CMC, Vellore for a lipid encapsulated mRNA-based vaccine. Early development work for an Intranasal vaccine candidate for COVID-19 has also been awarded to Indian Institute of Chemical Technology and support is being given under National Biopharma Mission of DBT for a project in University of Delhi South Campus where work has been initiated towards discovering neutralizing antibodies from an existing phage display-based library.

Further, to ensure complete indigenization of COVID diagnostics, support has already been provided to AMTZ and other companies to scale-up production of RT-PCR kits. In addition, anticipating long-term need for diagnostics, DBT/BIRAC have committed support for different types of diagnostics platforms like Fluorescence and Electrochemistry Mediated Rapid Detection of SARS-CoV-2 Nucleic Acid (Bennett University, Greater Noida); portable microfluidics embedded on chip rRT-PCR and microelectrode array coupled point-of-care optoelectronic device for large-scale screening (JNU, Delhi); Development and evaluation of aptamer-based lateral flow assay kit for detection of SARS-CoV-2 detection (IIT Delhi) and CRISPER-based diagnosis of COVID-19 using paper microfluidics form (IIT Guwahati).

Other companies to get funding support are Denovo, Biolabs, Shine Biotech, Prantae, Proma Therapeutics, and Achira. In total, 34 companies and academic institutes will receive financial support for ensuring there is no shortage of indigenous diagnostic kits in the near future.

BIRAC has also set up a 'Fast Track Review Process' to provide fund for COVID-19 solutions that are ready for immediate deployment. Through this initiative, following start-ups with PPE solutions have been approved for support: Aarna Biomedical Products for manufacturing "Full body coverage suits", Alpha Corpusles Pvt Ltd for "Face Shields", MicroGO for 'Automated Sanitizer', Stasis Health Pvt Ltd. and Monitra for remote patient monitoring, Turtle Shell for a sleep monitoring device, Perisodhana for N-95 Masks and Remidio for Ambu bags.

Contact info: Communication Cell of DBT/BIRAC

Website link:
https://pib.gov.in/PressReleasePage.aspx?PRID=1622757#

DBT ties up with A.P. MedTech Zone to augment critical medical equipment production

DBT has joined hands with Andhra Pradesh MedTech Zone (AMTZ) to develop a strategy to address the shortage of critical medical equipment in India and move progressively towards a stage of self-sufficiency.

AMTZ at Vishakapatnam is an established medical equipment manufacturing ecosystem and is a pioneer department within the Government of India to promote the medical technologies sector in the country. It is Asia's first medical equipment manufacturing ecosystem, uniquely dedicated for Medtech. The new collaboration named DBT AMTZ COMManD [COVID Medtech Manufacturing Development] strategy would be supported under DBT's National Biopharma Mission.

The strategy has 3 focal points:

1. Helping start-ups and innovators supported by DBT/BIRAC and AMTZ in the area of medical technologies with subsidised infrastructure for testing and validation, facilities for prototyping, adequate start-up space and facilitation of market access.

2. Provision of financial assistance for investment in plant and machinery so that there is a rapid scale-up of infrastructure and production capabilities. Many medical device manufacturers have the potential to make critical equipment like ventilators and diagnostic kits, thermal scanners or medical textiles, which are much needed in the context of COVID as well as post-COVID period. However, to rapidly scale up the manufacturing, it would require huge investments in plant and machinery. The new tie up will fill the gap.

3. Drafting of appropriate standards and safety norms and validation protocols for medical technologies such as ventilators and N95 masks. This would be an important area of support to ensure that quality and safety are upheld.

Contact info: Dr. Hafsa Ahmad (Email: nbm9@birac.nic.in);
Ms Ginny Bansal (Email:pmubmgf6@birac.nic.in)

Website link:
https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt-01S-12MAY2020.pdf

Launch of 1000 Genome sequencing of SARS-CoV-2 Virus

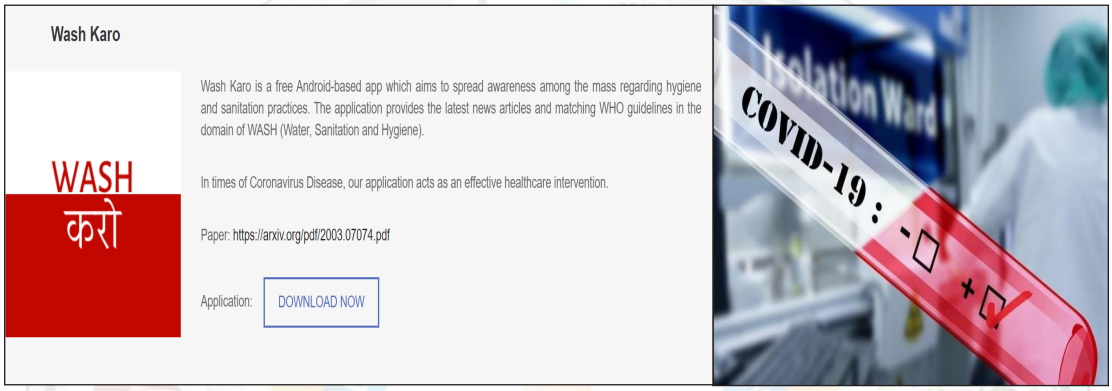
During a review of COVID-19 activities by Hon'ble Minister of Science & Technology, Health & Family Welfare and Earth Sciences the DBT announced launch of 1000 genome sequencing of SARS-CoV-2 virus by DBT Autonomous Institutions consortia to understand viral and host genomics of COVID-19 outbreak. This study will sequence 1000 SARS-CoV-2 genomes from the clinical samples to understand the evolving molecular phylogeny of the virus and the emerging mutations in the viral RNA as well as identify the host genetic variations which correlate with transmission, susceptibility and disease severity. This study is being coordinated by NIBMG, Kalyani with active participation from CDFD, Hyderabad; ILS, Bhubaneswar; NCCS, Pune; InStem, Bengaluru along with other DBT Autonomous Institutions. The findings of this study will also assist development of efficient diagnostic assays, vaccine and drug candidates and help formulate policies for containment of the outbreak.

Web Link:
https://twitter.com/DBTIndia/status/1255366254518509569?s=20

DBT-Wellcome Trust develops 'Wash Karo" App for COVID 19 awareness

An India Alliance fellow, Dr Tavpritesh Sethi at IIIT (Indraprastha Institute of Information Technology) Delhi and his team have developed an android-based app "Wash Karo" that functions as a complete Infodemic Management Suite. It was presented at WHO, Geneva on 8 April, via video conferencing. Wash Karo aims to provide the right information to the right people in the right format at the right time.

This APP aims to help the public, and its updated content is delivered in Hindi in the form of bite-sized audios for those who may not be able to read. Dr Sethi is also part of a Technology Innovation Group constituted by the Delhi Government to develop and maintain IT platforms viz. website and an app for COVID-19 management for Delhi.



Website link:
https://www.indiaalliance.org/news/415
https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt-03B-24APRIL-2020.pdf

DBT's Rapid Response Regulatory Framework for COVID-19

The DBT, Government of India along with Drug Controller General of India (DCGI) has developed and notified a Rapid Response Regulatory Framework to provide expedited regulatory approvals for all diagnostics drugs and vaccines. Vaccine development is being supported by three Indian industries. Research on therapeutic and drug development has started. According to reports from the Union Health Ministry, the ministry is talking to all states and union territories about the action plan being undertaken by the stakeholders.

Website link:
http://dbtindia.gov.in/latest-announcement/rapid-response-regulatory-framework-covid-19-compilation-notifications

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

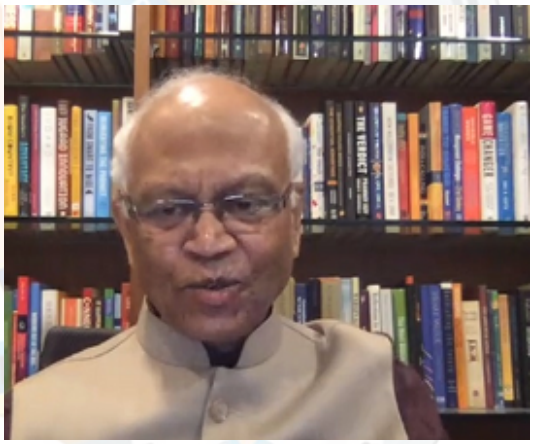
BY

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH (CSIR)

COVID-19 serves as a clarion call to achieve Atmanirbhar Bharat, says Dr Raghunath Mashelkar

COVID-19 has brought in to the country a clarion call for everyone to rebuild, recover, and re-imagine ourselves in order to achieve Atmanirbhar Bharat, said Padma Vibhushan, Dr Raghunath Anant Mashelkar. He was delivering a talk on "Building Atmanirbhar Bharat with Atmabishwas" under the Council for Scientific and Industrial Research-Summer Research Training Programme (CSIR-SRTP), 2020, programme coordinated by the North East Institute of Science and Technology (CSIR-NEIST).

Dr Mashelkar said that in our endeavour to attain self-reliance or Atmanirbhar Bharat, we cannot isolate ourselves from the world but integrate with global supply chain. He emphasized on five pillars of 'atmanirbharata' – Buy, Make, Buy to make better, Make to buy better, and Make it together (building public-private partnerships). He said that he has unequivocal confidence in the youth power of the country, which needs to be harnessed with a back-up of technology and trust for our country to flourish.



Dr Mashelkar was of the view that the 'Make in India' initiative should not focus only on assembling products but inventing in India as well. He said that assembling products will no doubt create jobs, but for newer substitutes, we need to do vigorous research. Underlining the importance of research, he said research converts money into knowledge and innovation converts knowledge into money, so both needs to go hand in hand for our nation to prosper.

Website:

https://vigyanprasar.gov.in/isw/COVID-19-serves-as-clarion-call-to-achieve-Atmanirbhar-Bharat.html

http://www.neist.res.in/covid19/

CSIR-IHBT helping Himachal in undertaking COVID-19 tests

The Institute of Himalayan Bio-Resource Technology (IHBT) at Palampur in Himachal Pradesh has been playing pivotal role in undertaking COVID-19 tests besides providing all necessary instruments and logistic support for test of COVID-19 to Tanda, Chamba and Hamirpur Medical Colleges of the State. This was stated by Chief Minister Jai Ram Thakur while addressing the CSIR-IHBT on its 38 Founders Week function through Video Conference from Shimla on July 3.

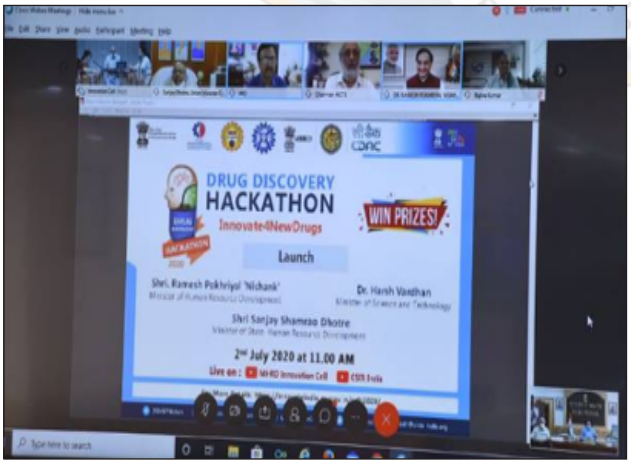
The Chief Minister said that the Institute had also succeeded in preparing alcohol-free hand sanitizer and herbal soap to the consumers. He said that the Institute was playing a major role in making Himachal Pradesh Aroma state of the country by production of aromatic oil from various plants.

Thakur said that the efforts of cultivation of Heeng and Kesar by the Institute were indeed laudable. He said that the state government has started Rs 4.50 crore Heeng project and Rs 5 crore Kesar Project. He also said that the state government would provide all possible help to the institute for making these projects a success. He said that efforts were being made in a big way to promote organic farming. He said that the production of Heeng and Kesar would prove to be a game changer to the farmers in strengthening their economy.

Website link:
https://www.csir.res.in/slider/csir-ihbt-helping-himachal-undertaking-covid-19-tests
https://www.ihbt.res.in/en/

Drug Discovery Hackathon-2020 for supporting drug discovery process

The Union Government launched Drug Discovery Hackathon here on July 2 in the presence of Union Minister for Science and Technology Dr. Harsh Vardhan and Union Minister for Human Resource Development Shri Ramesh Pokhriyal 'Nishank'. This is a joint initiative of MHRD's Innovation Cell (MIC), All India Council for Technical Education (AICTE) and CSIR and supported by Centre for Development of Advanced Computing (CDAC), MyGov as well as private players.



Minister of State for HRD Shri Sanjay Dhotre; Principal Scientific Advisor Prof. VijayRaghavan; DG CSIR, Dr Shekhar Mande; Chairman AICTE, Prof. Anil Sahasrabudhe; President, Pharmacy Council of India (PCI) Prof. B Suresh; and Chief Innovation Officer, MHRD, Dr.Abhay Jere were also present during the online launch programme.

This Hackathon is first of its kind national initiative for supporting drug discovery process and will see participation from professionals, faculty, researchers and students from varied fields like Computer Science, Chemistry, Pharmacy, Medical Sciences, Basic Sciences and Biotechnology.

Dr Harsh Vardhan, Minister for S&T said, "We need to establish the culture of Computational Drug Discovery in our country. In this initiative, MHRD's Innovation cell and AICTE will focus on identifying potential drug molecules through the Hackathon while CSIR will take these identified molecules forward for synthesis and laboratory testing for efficacy, toxicity, sensitivity and specificity."

Website link:
https://pib.gov.in/Pressreleaseshare.aspx?PRID=1635928#:~:text=This%20Drug%20Discovery%20Hackathon%20is,as%20well%20as%20private%20players.

https://www.csir.res.in/slider/join-us-today-launch-drug-discovery-hackathon-joint-initiative-csir-mhrd-and-aicte-office

Impactful S&T efforts initiated in last quarter

Dengue drug enters Phase II clinical trial for COVID-19

Sun Pharma has announced that it has commenced Phase II clinical trial on AQCH, a phytopharmaceutical (plant-derived) drug for treatment of COVID-19. The company received approval from the Drugs Controller General of India (DCGI) for conducting Phase II clinical trial in April this year. The research is being done in association with the CSIR and DBT.

The clinical trial will be conducted across 12 centres in 210 patients located in Delhi, Mumbai, Ahmedabad, and other places spread across the country. The treatment duration for patients will be 10 days. The results of the clinical trial are expected by October 2020. Human safety study of AQCH has already been completed and the drug has been found safe at the recommended dose for Phase II study. Since 2016, Sun Pharma has been working closely with DBT-International Centre for Genetic Engineering and Biotechnology (ICGEB), under the leadership of Dr. Navin Khanna and CSIR-Indian Institute of Integrative Medicine (IIIM), Jammu, under the leadership of Dr. Ram Vishwakarma, to develop a phytopharmaceutical drug for dengue.

Dilip Shanghvi, Managing Director, Sun Pharma said, "This is the first phytopharmaceutical drug approved for clinical trials by the DCGI as a potential treatment for COVID-19. AQCH has shown anti-SARS-CoV-2 effects in in-vitro studies conducted in collaboration with ICGEB, Italy. These results, combined with information on mechanism of action through in-vitro and small animal studies, give us the confidence to evaluate this potential treatment option for COVID-19 patients."

Website link:
https://vigyanprasar.gov.in/isw/Dengue-drug-enter-Phase-II-clinical-trial-for-COVID-19.html
https://www.iiim.res.in/

Dr Harsh Vardhan lauds the efforts of CSIR-IGIB scientists against COVID-19

"All scientists and institutions should prioritise the requirements of the time and also contribute in finding quick and deployable solutions," said Dr Harsh Vardhan, Minister for Science and Technology, Earth Sciences and Health and Family Welfare. He was addressing scientists at a review meeting on the initiatives of the CSIR towards mitigation of COVID-19 in the country.

Dr Harsh Vardhan appreciated CSIR for submitting 53 sequences of COVID-19 genomes to the Global Coronavirus Genome Database, Global Initiative on Sharing All Influenza Data (GISAID). "This is the result of a strong partnership between National Centre for Disease Control (NCDC), New Delhi and CSIR Institute of Genomics and Integrative Biology (CSIR-IGIB), representing the largest submission of sequences, by far from India by any group. The joint NCDC-IGIB programme will accelerate molecular epidemiology and viral surveillance efforts of India," he said.

Dr Shekhar C. Mande, DG, CSIR, apprised the Minister that CSIR has mounted a coordinated strategy involving all 38 CSIR labs and is working in close coordination with industry and other agencies for the implementation of interventions and technologies at the ground level. CSIR has devised five verticals - Digital and Molecular Surveillance; Rapid and Economical Diagnostics; New Drugs/Repurposing of Drugs/Vaccines; Hospital Assistive Devices and Personal protection equipment (PPEs); Supply Chain and Logistics Support Systems – to work on and develop requisite S&T-based solutions to combat COVID-19. The Directors coordinating the activities of these verticals reported the significant developments in each of them.

Website link:
https://vigyanprasar.gov.in/isw/Dr-Harsh-Vardhan-lauds-the-efforts-of-CSIR-scientists-against-COVID-19.html
https://www.csir.res.in/

Indian researchers to go for the clinical trial of sepsis drug against novel coronavirus

The CSIR is leaving no stone unturned in the battle against novel coronavirus. Repurposing of existing drugs is one of the strategies deployed by CSIR. The Council is implementing this strategy by evaluating an existing drug that is used for treating gram-negative sepsis patients.

The drug, Sepsivac, is available commercially. In gram-negative sepsis patients and in critically ill COVID-19 patients, the altered immuneresponse leads to a massive change in the cytokine profile. Cytokines are produced in response to an infection and they are essential for host defence against pathogens. There are six types of cytokines, each having different families of cytokines. The different mix of cytokines, called cytokine profiles, acts on various pathogens. One of the significant contributors to death by COVID-19 is heightened immune response, called a cytokine storm. The immune system starts attacking both infected and uninfected cells. It makes no difference between a friend and a foe, leading to tissue damage resulting in sepsis. The drug modulates the immune system of the body and thereby inhibits the cytokine storm leading to reduced mortality and faster recovery.

Website link:
https://vigyanprasar.gov.in/wp-content/uploads/Indian-researchers-to-go-for-clinical-trial-of-sepsis-drug-against-novel-coronavirus-21apr20.pdf

Homemade masks to overcome shortage

Shortage of facemask and hand sanitizers is a stark reality. With the outbreak of the COVID-19 pandemic, as anxious public frantically shopped hygiene products, in particular mask and hand sanitizers, the increased supply could not be met by the sudden burgeoning demand.

The Office of the Principal Scientific Advisor to the Government of India issued the manual on homemade masks: "Masks for Curbing the Spread of SARS-CoV-2 Coronavirus" for home fabrication. The key criteria for proposed designs are Ease of Access to Materials, Ease of Making at Home, and Ease of Use and Reuse.

Shops and services are demanding that the customers use facemask. In some shops the patrons are denied services for not using the face mask. The homemade mask would help people. Many health experts are also suggesting that use of facemask in public spaces could reduce the spread of the infection. The proposed guide is meant to provide a simple outline to make, use and reuse masks. This Manual could be used by NGOs and individuals to self-create such masks and accelerate widespread adoption of use of masks across India.

Protective masks lower the chances of coronavirus entering our respiratory system through droplets that are present in the air. According to a report published in PubMed analyses show that if 50% of the population were to wear masks, only 50% of the population would be infected by the virus. Once 80% of the population wears a mask, the outbreak can be stopped substantially. Wearing of masks is especially recommended for people living in densely populated areas.

The Science and Technology Empowered Committee was constituted on 19th March 2020. The Committee is jointly chaired by Prof. Vinod Paul, Member, NITI Aayog and Prof. K VijayRaghavan, Principal Scientific Adviser to the Government of India, and is responsible for coordination among science agencies, scientists, industries and regulatory bodies, and to take speedy decisions on research and development to implementation related to the SARS-CoV-2 virus and the COVID-19 disease.

Website link:
https://vigyanprasar.gov.in/wp-content/uploads/Homemade-masks-to-overcome-shortage-1apr20.pdf

Indian researchers start working on novel coronavirus genome sequencing

The novel coronavirus is a new virus and researchers are trying to figure out all the different aspects of it. Two institutes of CSIR, Centre for Cellular and Molecular Biology (CCMB), Hyderabad and Institute of Genomics and Integrative Biology (IGIB), New Delhi have started working together on the whole genome sequencing of the novel coronavirus. "This will help us to understand the evolution of the virus, how dynamic is it, and how fast it imitates. This study will help us to know how soon it evolves and what are the future aspects of it," said Dr Rakesh Mishra, Director, CCMB.

Website link:
https://vigyanprasar.gov.in/wp-content/uploads/Researchers-start-working-on-genome-sequencing-of-COVID-19-7apr20.pdf

Researchers culture novel coronavirus, may help in drug testing and vaccine development

The Centre for Cellular and Molecular Biology (CCMB) has established stable cultures of coronavirus (SARS-CoV-2) from patients' samples.Virologists at CCMB have isolated infectious viruses from several isolates. The ability to culture the virus in lab enables CCMB to work towards vaccine development and testing of potential drugs to fight COVID-19.

Novel coronavirus enters human cell by binding with the ACE-2 receptor on the cell surface. Not all cells have ACE-2 receptors. Human epithelial cells in the respiratory tract copiously express ACE-2 receptors, causing respiratory disease in the infected patient. However, we cannot grow human epithelial cells in lab. "Currently, primary epithelial cells generated from human origins do not grow for many generations in labs, which is key to culturing viruses continuously.At the same time, the labs that are growing the virus need an 'immortal' cell line", says Dr Krishnan H Harshan, Principal Scientist, CCMB. They use Vero cells (kidney epithelial cell lines from green African monkey), which express ACE-2 proteins and carry a cell division that allows them to proliferate indefinitely.

But why cultivate a dreadful germ? If we culture a large amount of the virus and inactivate them, then it can be used as inactivated virus vaccine. Once we inject the inactivated virus, the human immune system triggers the production of germ-specific antibodies. One can inactivate the virus by heat or chemical means. The inactivated virus can trigger antibody response, but does not infect and make us sick as they cannot reproduce.

Website link:
https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-1-27MAY2020.pdf
https://www.ccmb.res.in/

उमिफेनोविर के तीसरे चरण के परीक्षण के लिए सीएसआईआर प्रयोगशाला को मंजूरी

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (सीएसआईआर) की लखनऊ स्थित प्रयोगशाला सेंट्रल ड्रग रिसर्च इंस्टीट्यूट (सीडीआरआई) को एंटी–वायरल दवा उमिफेनोविर के तीसरे चरण के चिकित्सीय परीक्षण के लिए ड्रग कंट्रोलर जनरल ऑफ इंडिया (डीसीजीआई) की मंजूरी मिल गई है। यह मंजूरी मिलने के बाद भारतीय रोगियों पर इस दवा का परीक्षण किया जा सकेगा।

सीडीआरआई के वैज्ञानिकों का कहना है कि डीसीजीआई की मंजूरी मिलने के बाद अब इस दवा के प्रभाव, सुरक्षा और सहनशीलता के आकलन के लिए रेंडम, डबल ब्लाइंडेड, प्लेसबो नियंत्रित चिकित्सीय परीक्षण किए जा सकेंगे। सीडीआरआई द्वारा ये परीक्षण लखनऊ के किंग जॉर्ज मेडिकल यूनिवर्सिटी (केजीएमयू), डॉ राम मनोहर लोहिया इंस्टीट्यूट ऑफ मेडिकल साइंसेज (आरएमएलआईएमएस) और एराज लखनऊ मेडिकल कॉलेज ऐंड हॉस्पिटल में किया जाएगा।

मानव कोशिकाओं में वायरस के प्रवेश को रोकने एवं प्रतिरक्षा प्रणाली को सक्रिय करके यह दवा कार्य करती है और इसके उपयोग को सुरक्षित पाया गया है। चीन और रूस में उमिफेनोविर का उपयोग मुख्य रूप से इन्फ्लुएंजा के इलाज के लिए किया जाता है एवं अन्य किसी देश में यह उपलब्ध नहीं है। हाल ही में कोविड–19 के रोगियों के उपचार के लिए इस दवा के संभावित उपयोग को चिह्नित किया गया है।

भारतीय रोगियों में इस दवा के प्रभाव के मूल्यांकन के लिए चिकित्सीय परीक्षण की अनुमति मिलने के साथ ही सीडीआरआई ने बेहद कम समय में उमिफेनोविर के निर्माण के लिए प्रक्रिया विकसित की है। दवा के निर्माण और विपणन के लिए संस्थान द्वारा विकसित प्रौद्योगिकी मेडिजेस्ट फार्मास्यूटिकल्स प्राइवेट लिमिटेड, गोवा को हस्तांतरित की गई है, जिन्होंने पहले ही इसके लिए डीसीजीआई से टेस्ट लाइसेंस प्राप्त कर लिया है।

सीडीआरआई के निदेशक प्रोफेसर तपस कुंडू ने कहा है कि दवा के लिए सभी सक्रिय औषध तत्व स्वदेशी रूप से उपलब्ध हैं और चिकित्सीय परीक्षण सफल होता है तो उमिफेनोविर कोविड–19 के खिलाफ एक सुरक्षित, प्रभावकारी, सस्ती दवा के रूप में उभर सकती है और राष्ट्रीय कार्यक्रम का हिस्सा हो सकती है। प्रोफेसर कुंडू ने यह भी कहा कि इस दवा की रोग प्रतिरोधक क्षमता काफी अच्छी देखी गई है।

कोविड–19 के लिए डीसीजीआई ने उच्च प्राथमिकता के आधार पर इस आवेदन को संसाधित किया है। परीक्षण के अगले चरणों को तेजी से ट्रैक किया जा रहा है ताकि जल्दी से जल्दी भारतीय मरीजों को यह दवा उपलब्ध हो सके।

सीएसआईआर के महानिदेशक डॉ. शेखर सी. मांडे ने कहा है कि यह चिकित्सीय परीक्षण कोविड–19 के लिए दवाओं के पुनरू उपयोग की सीएसआईआर रणनीति का एक अभिन्न हिस्सा है। उन्होने सीडीआरआई के युवा वैज्ञानिकों डॉ अजय कुमार श्रीवास्तव, चंद्रभूषण त्रिपाठी, नयन घोष और नीलांजना मजुमदार की टीम एवं इस परियोजना के नोडल वैज्ञानिक डॉ. रविशंकर रामचंद्रन के प्रयासों को भी सराहा है।

ड्रग का फॉर्मूलेशन एवं दस्तावेजीकरण करने वाली टीम में डॉ पी.आर. मिश्रा, विवेक भोसले, आर.के. त्रिपाठी, एस.के. रथ और शरद शर्मा शामिल हैं।

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कोरोना वायरस के खिलाफ मोनोक्लोनल एंटीबॉडी विकसित करने के लिए नयी परियोजना

काउंसिल ऑफ साइंटिफिक ऐंड इंडस्ट्रियल रिसर्च (सीएसआईआर) ने अपने न्यू मिलेनियम इंडियन टेक्नोलॉजी लीडरशिप इनिशिएटिव (एनएमआईटीएलआई) कार्यक्रम के तहत मानव मोनोक्लोनल एंटीबॉडी के विकास की एक नयी परियोजना को मंजूरी दी है, जो रोगियों में कोरोना वायरस के संक्रमण को बेअसर कर सकती है। इस परियोजना का उद्देश्य एक प्रभावी चिकित्सा रणनीति के जरिये अधिक प्रभावी और विशिष्ट मानव मोनोक्लोनल एंटीबॉडी विकसित करना है।

परियोजना का एक लक्ष्य वायरस के भविष्य के अनुकूलन का अनुमान लगाना भी है। इसके साथ ही, वैज्ञानिक मानव मोनोक्लोनल एंटीबॉडी क्लोन तैयार करने का प्रयास भी करेंगे, जो रूपांतरित कोरोना वायरस को बेअसर कर सके। वैज्ञानिकों की इस पहल का लक्ष्य कोरोना वायरस के नये उभरते रूपों से लड़ने के लिए तैयारी करना भी है, ताकि भविष्य में इसके संक्रमण से मुकाबला किया जा सके।

मोनोक्लोनल एंटीबॉडी एक तरह का प्रोटीन होता है, जिसे प्रयोगशाला में बनाया जाता है। यह रोगी के शरीर में मौजूद दुश्मन कोशिका से जाकर चिपक जाता है। मोनोक्लोनल एंटीबॉडी थेरेपी इम्यूनोथेरेपी का एक रूप है, जिसे किसी बीमारी के प्रति प्रतिरक्षा उत्पन्न करने या प्रतिरक्षा प्रणाली द्वारा प्रतिरोधक क्षमता बढ़ाने के लिए डिजाइन किया जाता है।

अकादमिक संस्थानों और इंडस्ट्री के बीच इस साझेदारी में नेशनल सेंटर फॉर सेल साइंस (एनसीसीएस), पुणेय भारतीय प्रद्यौगिकी संस्थान (आईआईटी), इंदौरय प्रीडोमिक्स टेक्नोलॉजीज, गुरुग्राम और भारत बायोटेक इंटरनेशनल लिमिटेड (बीबीआईएल), हैदराबाद शामिल हैं। टीकों और जैव–उपचार के विकास से जुड़ी कंपनी बीबीआईएल इस परियोजना का नेतृत्व कर रही है। बीबीआईएल परियोजना का वाणिज्यिक साझीदार है, जिसकी जिम्मेदारी मानव मोनोक्लोनल एंटीबॉडी के विकास और व्यवसायीकरण की भी होगी।

सीएसआईआर के महानिदेशक डॉ शेखर सी. मांडे ने कहा है कि "नोवेल कोरोना वायरस (एसएआरएस–सीओवी–2) के बारे में अनुसंधान अपने शुरुआती चरण में है, और इस पर हमारी समझ हर दिन विकसित हो रही है। ऐसे में, यह महत्वपूर्ण है कि हमें वायरस से निपटने के लिए सभी संभावित रणनीतियों को अपनाने की आवश्यकता है। इसलिए, सीएसआईआर सभी रास्ते तलाश रहा है और हम उन नये विचारों का भी समर्थन कर रहे हैं, जिन पर अमल किया जा सकता है।''

कोरोना वायरस से लड़ने के लिए सीएसआईआर बहुआयामी रणनीति पर काम कर रहा है। एक ओर सीएसआईआर से संबद्ध प्रयोगशालाएं प्रौद्योगिकियों एवं उत्पादों का विकास कर रही हैं, तो दूसरी ओर देश का यह प्रमुख वैज्ञानिक संस्थान इंडस्ट्री और सार्वजनिक क्षेत्र के उपक्रमों के साथ मिलकर भी काम कर रहा है। एनएमआईटीएलआई सीएसआईआर का एक फ्लैगशिप कार्यक्रम है, जिसका उद्देश्य अकादमिक संस्थानों एवं इंडस्ट्री के नये विचारों और परियोजनाओं का समर्थन करना है।

Website Link:
https://vigyanprasar.gov.in/isw/Indian-scientists-develop-paper-strip-kit-for-testing-Kovid-19-hindi.html

कोविड–19 परीक्षण के लिए भारतीय वैज्ञानिकों ने विकसित की पेपर–स्ट्रिप किट

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (सीएसआईआर) के वैज्ञानिकों को कोविड–19 के त्वरित परीक्षण के लिए एक नई किट विकसित में बड़ी सफलता मिली है। सीएसआईआर से संबद्ध नई दिल्ली स्थित जिनोमिकी और समवेत जीव विज्ञान संस्थान (आईजीआईबी) के वैज्ञानिकों द्वारा विकसित यह एक पेपर–स्ट्रिप आधारित परीक्षण किट है, जिसकी मदद से कम समय में कोविड–19 के संक्रमण का पता लगाया जा सकता है।

यह पेपर स्ट्रिप–आधारित परीक्षण किट आईजीआईबी के वैज्ञानिक डॉ सौविक मैती और डॉ देबज्योति चक्रवर्ती की अगुवाई वाली एक टीम ने विकसित की है। यह किट एक घंटे से भी कम समय में नये कोरोना वायरस (एसएआरएस–सीओवी–2) के वायरल आरएनए का पता लगा सकती है। वैज्ञानिकों का कहना है कि आमतौर पर प्रचलित परीक्षण विधियों के मुकाबले यह एक पेपर–स्ट्रिप किट काफी सस्ती है और इसके विकसित होने के बाद बड़े पैमाने पर कोरोना के परीक्षण चुनौती से निपटने में मदद मिल सकती है।

आईजीआईबी के वैज्ञानिक डॉ देबज्योति चक्रवर्ती ने इंडिया साइंस वायर को बताया कि "संक्रमण के शिकार संदिग्ध व्यक्तियों में कोरोना वायरस के जीनोमिक अनुक्रम की पहचान करने के लिए इस पेपर–किट में जीन–संपादन की अत्याधुनिक तकनीक क्रिस्पर–कैस–9 का उपयोग किया गया है।" इस किट की एक खासियत यह है कि इसका उपयोग तेजी से फैल रही कोविड–19 महामारी का पता लगाने के लिए व्यापक स्तर पर किया जा सकेगा।

डॉ देबज्योति चक्रवर्ती ने कहा, 'अभी इस परीक्षण किट की वैद्यता का परीक्षण किया जा रहा है, जिसके पूरा होने के बाद इसका उपयोग नये कोरोना वायरस के परीक्षण के लिए किया जा सकेगा। इस किट के आने से वायरस के परीक्षण के लिए वर्तमान में इस्तेमाल की जाने वाली महँगी रियल टाइम पीसीआर मशीनों की जरूरत नहीं पड़ेगी। नई किट के उपयोग से परीक्षण की लागत करीब 500 रुपये आती है।'

आईजीआईबी के वैज्ञानिकों ने बताया कि वे इस टूल पर लगभग दो साल से काम कर रहे हैं। लेकिन, जनवरी के अंत में, जब चीन में कोरोना का प्रकोप चरम पर था, तो उन्होंने यह देखने के लिए परीक्षण शुरू किया कि यह किट कोविड–19 का पता लगाने में कितनी कारगर हो सकती है। इस कवायद में किसी नतीजे पर पहुँचने के लिए आईजीआईबी के वैज्ञानिक पिछले करीब दो महीनों से दिन–रात जुटे हुए थे।

सीएसआईआर के महानिदेशक डॉ शेखर सी. मांडे ने कहा है दृ "इस किट के विकास से जुड़े प्राथमिक परिणाम उत्साहजनक हैं। हालाँकि, प्राथमिक नतीजे अभी सीमित नमूनों पर देखे गए हैं और इसका परीक्षण बड़े पैमाने पर किया जा रहा है। दूसरे देशों से मंगाए गए नमूनों पर भी इसका परीक्षण किया जाएगा। नियामक निकायों से इसके उपयोग की अनुमति जल्दी ही मिल सकती है, जिसके बाद इस किट का उपयोग परीक्षण के लिए किया जा सकता है।"

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कोविड–19 के खिलाफ तैनात स्वास्थ्यकर्मियों के लिए सुरक्षात्मक चश्मा

कोविड–19 से लड़ रहे अग्रिम पंक्ति में तैनात स्वास्थ्यकर्मियों को संक्रमण से बचाने के लिए व्यक्तिगत सुरक्षा उपकरणों (पीपीई) की माँग बढ़ रही है। इस दिशा में कार्य करते हुए केंद्रीय वैज्ञानिक उपकरण संगठन (सीएसआईओ), चंडीगढ़ के शोधकर्ताओं ने ऐसा सुरक्षात्मक चश्मा बनाने की तकनीक विकसित की है, जो कोविड–19 महामारी के खिलाफ लड़ रहे स्वास्थ्यकर्मियों, पुलिस, सफाई कर्मचारियों और आम लोगों को संक्रमण से बचाने में मददगार हो सकता है।

पलकों के भीतर आँख की पुतलियों को चिकनाई देने वाली नेत्र श्लेषमला झिल्ली (Conjunctiva), शरीर में एकमात्र आवरण रहित श्लेष्म (डनबवने) झिल्ली होती है। आँखें खुलती हैं तो नेत्र श्लेषमला झिल्ली बाहरी वातावरण के संपर्क में आती है, जो अनजाने में वायरस के प्रवेश का कारण बन सकती है। सीएसआईओ के शोधकर्ताओं का कहना है कि यह सुरक्षात्मक चश्मा इस चुनौती से लड़ने में मदद कर सकता है। इस चश्मे को कुछ इस तरह से बनाया गया है, जिससे स्वास्थ्यकर्मियों को खतरनाक एरोसॉल के साथ–साथ अन्य निलंबित कणों से बचाया जा सकता है।

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (सीएसआईआर) की चंडीगढ़ स्थित प्रयोगशाला सीएसआईओ द्वारा इस चश्मे के बड़े पैमाने पर व्यावसायिक उत्पादन के लिए इसकी तकनीक हाल में चंडीगढ़ की कंपनी सार्क इंडस्ट्रीज को सौंपी गई है। शोधकर्ताओं का कहना है कि महामारी की मौजूदा स्थिति ने प्रभावी व्यक्तिगत सुरक्षा उपकरणों (पीपीई) की जरूरत की ओर ध्यान आकर्षित किया है, ताकि स्वास्थ्यकर्मियों, मरीजों और अनजाने में संक्रमित होने वाले अस्पताल के आंगतुकों को संक्रमण से बचाया जा सके।

इस सुरक्षात्मक चश्मे में लचीला फ्रेम लगाया गया है, ताकि यह त्वचा के साथ प्रभावी सीलिंग के रूप में आँखों के ऊपर एक अवरोधक के रूप में कार्य कर सके। आँखों के आसपास की त्वचा को कवर करने में सक्षम इस चश्मे के फ्रेम को कुछ इस तरह डिजाइन किया गया है, जिससे इसमें प्रिस्क्रिप्शन ग्लास भी लगा सकते हैं। इस चश्मे में मजबूत पॉलीकार्बोनेट लेंस और पहनने में आसानी के लिए इलास्टिक पट्टे का उपयोग किया गया है।

सीएसआईओ के ऑप्टिकल डिवाइसेज ऐंड सिस्टम्स विभाग के प्रमुख डॉ विनोद कराड़ के नेतृत्व में संस्थान के शोधकर्ताओं की एक टीम ने मिलकर यह तकनीक विकसित की है। इस चश्मे की तकनीक को विकसित करने के लिए उद्योगों और संबंधित हितधारकों के सुझावों को भी शामिल किया गया है।

डॉ संजय कुमार, डॉ विनोद कराड़ और डॉ नेहा खत्री

वीडियो कॉन्फ्रेंसिंग के जरिये प्रौद्योगिकी हस्तांतरण कार्यक्रम को संबोधित करते हुए सीएसआईओ के निदेशक डॉ संजय कुमार ने कहा है कि "यह तकनीक इस प्रयोगशाला के निरंतर प्रयासों का परिणाम है, जो कोविड–19 का मुकाबला करने के उद्देश्य से तकनीकी समाधान विकसित करने और स्वास्थ्य सेवाओं के बुनियादी ढांचे का समर्थन करने के लिए किये जा रहे हैं।"

परियोजना से जुड़ीं प्रमुख शोधकर्ता डॉ नेहा खत्री ने बताया कि "इस चश्मे को विभिन्न पर्यावरणीय परिस्थितियों में उपयोग किया जा सकता है।" सीएसआईओ में बिजनेस इनिशिएटिव्स ऐंड प्रोजेक्ट प्लानिंग के प्रमुख डॉ सुरेंदर एस. सैनी ने बताया कि "इस सुरक्षात्मक चश्मे का उपयोग स्वास्थ्यकर्मियों के अलावा आम लोग भी कर सकते हैं।"

सार्क इंडस्ट्रीज के मैनेजिंग पार्टनर अनिल सहली ने कहा है कि कंपनी इस चश्मे की मार्किटिंग विभिन्न वर्गों के उपभोक्ताओं को ध्यान में रखकर करेगी, जिसमें स्वास्थ्यकर्मियों के अलावा पुलिसकर्मी, सार्वजनिक कार्यालयों में कार्यरत कर्मचारी और आम लोग शामिल हैं।

इस परियोजना में डॉ कराड़ और डॉ खत्री के अलावा डॉ संजीव सोनी, डॉ अमित एल. शर्मा, डॉ मुकेश कुमार और विनोद मिश्रा शामिल हैं।

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कोविड–19 के परीक्षण के लिए एनबीआरआई में वायरोलॉजी प्रयोगशाला

कोरोना वायरस के बढ़ते प्रकोप को नियंत्रित करने का एक प्रभावी तरीका इसके परीक्षण को बढ़ाकर कोविड–19 के शिकार लोगों की पहचान करना है। इस दिशा में एक नई पहल के अंतर्गत कार्य करते हुए वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (सीएसआईआर) की लखनऊ स्थित प्रयोगशाला राष्ट्रीय वनस्पति अनुसंधान संस्थान (एनबीआरआई) में कोविड–19 के परीक्षण के लिए अत्याधुनिक वायरोलॉजी प्रयोगशाला की शुरुआत की गई है।

इस वायरोलॉजी प्रयोगशाला का उद्घाटन शनिवार को उत्तर प्रदेश सरकार के मुख्य सचिव आर.के. तिवारी और किंग जॉर्ज मेडिकल यूनिवर्सिटी के कुलपति प्रोफेसर एम.एल.बी. भट्ट ने किया है। एनबीआरआई के निदेशक प्रोफेसर एस.के. बारिक ने बताया कि यह परीक्षण सुविधा भारतीय आयुर्विज्ञान अनुसंधान परिषद (आईसीएमआर), विश्व स्वास्थ्य संगठन (डब्ल्यूएचओ) तथा स्वास्थ्य एवं परिवार कल्याण मंत्रालय के दिशा–निर्देशों के अनुसार स्थापित की गई है।

कोरोना वायरस से लड़ने के लिए किए जा रहे प्रयासों के तहत कोविड–19 के परीक्षण के लिए लखनऊ में शुरू की गई यह सीएसआईआर से संबंधित तीसरी प्रयोगशाला है। इससे पहले सीएसआईआर–सेंट्रल ड्रग रिसर्च इंस्टीट्यूट (सीडीआरआई) एवं सीएसआईआर–इंडियन इंस्टीट्यूट ऑफ टॉक्सिकोलॉजी (आईआईटीआर) में भी कोविड–19 के परीक्षण केंद्र बनाए गए हैं।

एनबीआरआई को कोविड–19 के नमूने लखनऊ की ही किंग जॉर्ज मेडिकल यूनिवर्सिटी द्वारा प्रदान किए जाएंगे। प्रोफेसर बारीक ने बताया कि कोरोना वायरस महामारी को ध्यान में रखते हुए एनबीआरआई ने पादप विज्ञान के क्षेत्र में एक प्रमुख शोध संस्थान होने के नाते उच्च अधिकारियों के निर्देशन में परीक्षण सुविधा विकसित करने की पहल की है।

एनबीआरआई में स्थापित परीक्षण सुविधा के समन्वयक डॉ. एस.वी. सावंत ने कहा कि शुरू में 100 नमूनों के साथ यह परीक्षण सुविधा आरंभ होगी, जिसे बाद में आवश्यकता के अनुसार बढ़ाया जा सकता है। एनबीआरआई मुख्य रूप पादप आधारित शोध के लिए जाना जाता है। इसीलिए, संस्थान की टीम को इस परीक्षण सुविधा के संचालन के लिए विशेषज्ञों द्वारा किंग जॉर्ज मेडिकल यूनिवर्सिटी और सीएसआईआर–आईआईटीआर में प्रशिक्षण दिया गया है। इस परियोजना में एनबीआरआई के साथ–साथ सीएसआईआर–सीमैप की टीम

भी साथ मे काम करेगी। मुख्य सचिव आर.के. तिवारी ने संस्थान के वैज्ञानिकों को बधाई देते हुए कहा है कि पादप विज्ञान का अग्रणी संस्थान होने के बावजूद एनबीआरआई ने पहल करते हुए कोरोना परीक्षण केंद्र बनाकर एक मिसाल कायम की है।

कोविड–19 परीक्षण केंद्र के बारे में बताते हुए एनबीआरआई के वैज्ञानिक

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दूरदराज क्षेत्रों में महत्वपूर्ण हो सकती है एनसीएल की ऑक्सीजन संवर्धन यूनिट

कोविड–19 के बढ़ते मामलों को देखते हुए नेशनल केमिकल लैबोरेटरी (एनसीएल) पुणे के वैज्ञानिकों द्वारा विकसित ऑक्सीजन संवर्धन यूनिट (ओईयू) का महत्व बढ़ रहा है। इसे विकसित करने वाले शोधकर्ताओं का कहना है कि यह एक पोर्टबल उपकरण है, जिसका उपयोग घरों, अस्पतालों और ग्रामीण तथा दूरदराज क्षेत्रों में आवश्यकता पड़ने पर किया जा सकता है।

शुरुआत में पूरक ऑक्सीजन मिल जाए तो मरीजों के स्वस्थ होने की दर बढ़ायी जा सकती है। ऐसे में, उन मरीजों की संख्या में भी कमी लायी सकती है, जिन्हें आगे चलकर वेंटिलेटर की जरूरत पड़ती है। वेंटिलेटर पर रखे जाने के बाद भी मरीजों को इस ऑक्सीजन संवर्धन यूनिट की मदद से उपचार दिया जा सकता है। इसकी एक खूबी यह है कि इसमें ऑक्सीजन सिलेंडर की जरूरत नहीं पड़ती। शोधकर्ताओं का कहना है कि इस यूनिट के उपयोग से वेंटिलेटर और ऑक्सीजन सिलेंडरों की मांग को कम करने में मदद मिल सकती है।

ओईयू से जुड़ी प्रौद्योगिकी एनसीएल के पॉलिमर साइंस ऐंड इंजीनियरिंग डिविजन के वैज्ञानिकों और उनके द्वारा समर्थित स्टार्टअप कंपनी जेनरिच मेम्ब्रेन द्वारा मिलकर विकसित की गई है। एनसीएल के पॉलिमर साइंस ऐंड इंजीनियरिंग विभाग के प्रमुख उल्हास खारुल के नेतृत्व में वैज्ञानिकों की एक टीम ने ऑक्सीजन को संवर्धित करने के लिए हॉलो फाइबर झिल्ली का उपयोग किया है।

हॉलो फाइबर झिल्लीय खोखले फाइबर के रूप में आंशिक अवरोध से युक्त एक प्रकार की कृत्रिम झिल्ली होती है। यह झिल्ली ऐसे अवरोधक की तरह काम करती है, जो कुछ चीजों को तो अपने भीतर से होकर गुजरने देती है, लेकिन अन्य चीजों को रोक लेती है। इनमें अणु, आयन या अन्य छोटे कण शामिल हो सकते हैं।

अस्पताल में रोगों के उपचार में काफी मात्रा में ऑक्सीजन की आवश्यकता होती है। इन्टेंसिव केयर यूनिट (आईसीयू) और ऑपरेशन थियेटर में उपचार के दौरान मरीजों को सांस लेते समय 90 प्रतिशत तक ऑक्सीजन की जरूरत पड़ सकती है। इसी तरह, फेफड़ों से संबंधित बीमारियों के उपचार के समय 27–35 प्रतिशत ऑक्सीजन युक्त श्वसन वायु की आवश्यकता होती है। आमतौर पर, वातावरण में करीब 21 प्रतिशत ऑक्सीजन पायी जाती है। वातावरण में मौजूद हवा से ऑक्सीजन संवर्धन के लिए कुछ अन्य तकनीकों का भी उपयोग हो सकता है। शून्य से 200 डिग्री सेल्सियस कम तापमान पर हवा में ऑक्सीजन का स्तर बढ़ाने के लिए उपयोग होने वाली क्राइअजेनिक (निम्नतापीय) तकनीक और गैसों के मिश्रण से कुछ गैसों को अलग करने के लिए उपयोग होने वाली प्रेशर स्विंग अवशोषण ऐसी ही कुछ तकनीकें हैं। लेकिन, ये दोनों काफी महंगी प्रौद्योगिकियां हैं।

डॉ खारुल और उनकी टीम द्वारा विकसित ओईयू 0.5–15 लीटर प्रति मिनट की दर से 35–40 प्रतिशत ऑक्सीजन प्रवाहित कर सकती है। इसमें एक निश्चित दबाव पर वातावरण में मौजूद हवा को हॉलो फाइबर में प्रवाहित किया जाता है, जो अपने विशेष गुणों के कारण ऑक्सीजन को सोखने की क्षमता रखती है। एनसीएल की विज्ञप्ति में बताया गया है कि विभिन्न मंचों, अस्पतालों और प्राथमिक स्वास्थ्य केंद्रों में ऐसी लगभग 50 इकाइयों को असेंबल करके प्रदर्शित किया गया है।

एनसीएल ने ओईयू के प्रोटोटाइप की वैधता के परीक्षण के लिए बंगलुरु स्थित टीयूवी इंडिया में आवेदन किया था, जिसमें इस प्रौद्योगिकी को सही पाया गया है। डॉ खारुल ने बताया कि श्शसामग्री की आपूर्ति और श्रम की उपलब्धता से जुड़ी बाधाओं के बावजूद एनसीएल और जेनरिच मेम्ब्रेन्स मिलकर लॉकडाउन के दौरान ऐसी तीन यूनिट बना चुके हैं। इन यूनिटों का पुणे के नायडू अस्पताल में कोविड–19 के उन मरीजों पर परीक्षण किया जा रहा है, जिनको शारीरिक क्रियाकलाप बनाए रखने के लिए पर्याप्त ऑक्सीजन की कमी से जूझना पड़ता है।

एनसील ने ओईयू के उत्पादन के लिए जेनरिच मेम्ब्रेन्स के अलावा भारत इलेक्ट्रॉनिक्स (बीईएल), पुणे के साथ भी करार किया है। ऑक्सीजन संवर्धन यूनिट का उत्पादन जेनरिच मेम्ब्रेन के साथ–साथ भारत इलेक्ट्रॉनिक्स लिमिटेड द्वारा किया जा रहा है। बीईएल के महाप्रबंधक के. राजेंद्र ने कहा है कि "मौजूदा मेडिकल चुनौती को देखते हुए बीईएल इस परियोजना पर युद्ध स्तर पर काम कर रही है। हम अब तक 10 यूनिट बेहद कम समय में बना चुके हैं। बीईएल की योजना जल्दी ही 100 अन्य यूनिट बनाने की है।"

सीएसआईआर–एनसीएल और जेनरिच मेम्ब्रेन्स द्वारा विकसित ऑक्सीजन संवर्धन यूनिट

Website Link:
https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-2-26-June-20.pdf

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

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

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 rapid antigen-based detection assays for Coronavirus wherein all manufacturers who have developed antigen-based assays have been invited for validation. 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

Website Link:
https://www.icmr.gov.in/pdf/tender/Revised_EOI_for_Ag_kit_validation.pdf
https://www.icmr.gov.in/tender.html

ICMR fast-tracks the development of vaccine against COVID-19 pandemic

An inactivated COVID-19 vaccine candidate has been developed by Bharat Biotech International Ltd (BBIL) in collaboration with ICMR – National institute ofVirology (NIV), Pune. After intense characterization and review of all data from BBIL, ICMR is supporting the clinical development as the vaccine candidate appears to be promising. Based on in-depth scrutiny of the available data from pre-clinical studies, the Drugs Controller General of India has accorded permission to conduct phase 1 and 2 clinical trial.

ICMR's process is exactly in accordance with the globally accepted norms to fast-track the vaccine development for diseases of pandemic potential wherein human and animal trials can continue in parallel. ICMR is committed to treat the safety and interest of people of India as a topmost priority.

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Website Link:
https://www.icmr.gov.in/pdf/press_realease_files/ICMR_Press_Release_04072020.pdf

MoHFW releases revised guidelines for home isolation of very mild/pre-symptomatic/asymptomatic COVID-19 patients

Ministry of Health and Family Welfare (MoHFW) issued revised guidelines for home isolation of very mild/pre-symptomatic/asymptomatic COVID-19 cases on 2nd July 2020. The guidelines are in supersession to the guidelines issued on the subject on 10thMay, 2020. As per the guidelines, the patients should be clinically assigned as very mild/mild, moderate or severe, and accordingly admitted to (i) COVID Care Centre, (ii) Dedicated COVID Health Centre or (iii) Dedicated COVID Hospital, respectively. In view of the large number of asymptomatic cases being detected, the current guidelines have been extended to asymptomatic positive cases also besides very mild and pre-symptomatic cases.

Website Link:
https://www.mohfw.gov.in/pdf/RevisedHomeIsolationGuidelines.pdf

Clinical Management Protocol for COVID-19 patients released by MoHFW

Ministry of Health and Family Welfare (MoHFW) has released Clinical Management Protocol for COVID-19 patients on 3rd July 2020. This document contains all information related to COVID-19 pandemic, like disease epidemiology, case definition, risk factors, infection prevention, control practices, laboratory diagnosis, investigational therapies, prevention of complications, etc.

Website Link:
https://www.mohfw.gov.in/pdf/UpdatedClinicalManagementProtocolforCOVID19dated03072020.pdf

Impactful S&T efforts initiated in last quarter

India became self-reliant in COVID-19 testing capacity

On 18 May India reached a landmark in its fight against COVID-19 by performing 100,000 tests in one day. Starting from less than 100 tests per day just two months ago, a 1000 fold increase in just 60 days was made possible by dedicated teams from research institutions, medical colleges, testing laboratories, ministries, airlines and postal services working together.

The remarkable story of how India became fully self-reliant in its testing capabilities, despite starting from scratch just a few months ago, is one about the steely resolve of multiple agencies, working together round-the-clock to save lives.

Faced with an unprecedented challenge, both in terms of technicalities and scale, Indian scientists had to innovate extensively, health workers had to train and learn on the job, administrators had to coordinate multiple actions round-the-clock amid the challenges of nationwide lockdown, and civil and defence aviation personnel had to fly at the shortest of notices.

With the pandemic soaring, there were severe constraints for procuring COVID-19 diagnostic material. Empowered groups set up by the Government of India, cutting across ministries, were tasked with the objective of increasing procurement and ensuring regular supplies. Indian missions and embassies abroad helped identify global suppliers in a highly competitive seller's market.

The scale-up of testing laboratories started with a network of 106 ICMR-fundedViral Research and Diagnostic Laboratories, (VRDLs), which already had the capacity to conduct testing for viruses similar to SARS-CoV-2. Subsequently, the testing was initiated in partnership with laboratories in DST, DBT, ICAR, CSIR, DRDO, MHRD, medical colleges and private laboratories. Private laboratories that had approval from the National Accreditation Board for Testing and Calibration Laboratories (NABL) were accepted. With its testing capabilities now matching the most advanced countries in the world, Indian institutions have risen to the occasion in an emergency situation. In the days ahead their contributions will be required even more as India continues to grapple with the clear and present danger still posed by COVID-19

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Dr Nivedita Gupta; drguptanivedita@gmail.com

Website link:
https://www.icmr.gov.in/pdf/press_realease_files/ICMR_Press_Release_India_testing_story_20052020.pdf

ICMR-NIRRH provides information related to pregnant women with SARS-CoV-2 exposure

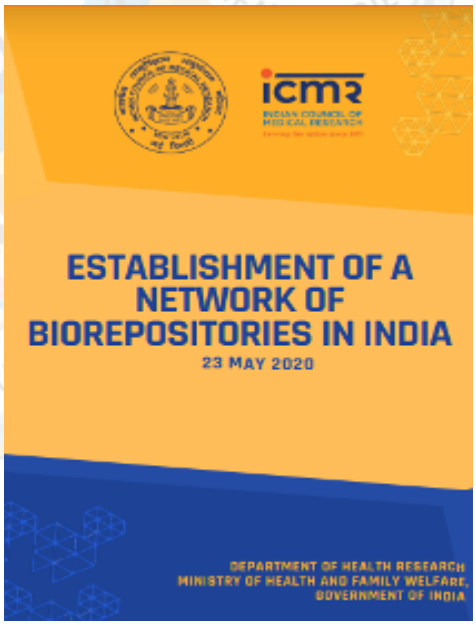
ICMR - National Institute for Research in Reproductive Health (NIRRH) provided flowchart for pregnant women with SARS-CoV-2 exposure who has travelled to an affected country within the previous 14 days and have a close contact with a confirmed case of COVID-19 (i.e. less than 1 metre and for more than 15 minutes, living together, and direct contact with body fluids).

Website Link:
http://www.nirrh.res.in/flowchart-guidance-of-management-of-pregnant-women-in-covid-19-pandemic/

http://www.nirrh.res.in/wp-content/uploads/2020/04/Flowchart-Guidance-of-Management-of-Pregnant-Women-in-COVID-19-Pandemic.pdf

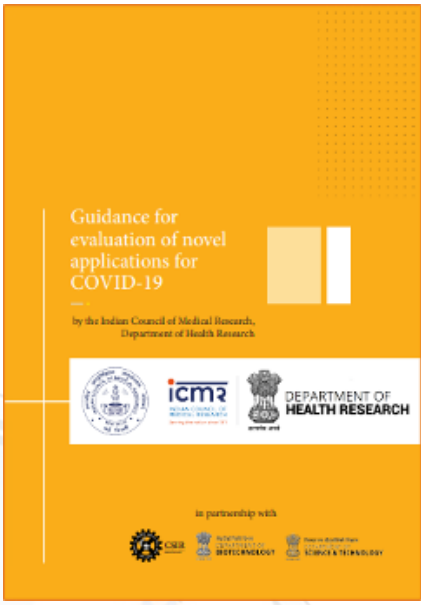
Establishment of a Network of COVID-19 Biorepositories in India

In the backdrop of the COVID-19 pandemic, while it is of paramount importance to provide early diagnosis and treatment to all infected individuals, it is also critical to promote research and development for larger public health benefit. For development and validation of new diagnostics, therapeutics or vaccines, access to different kinds of clinical samples from infected patients is an essential requirement. NITI Aayog has recently issued guidelines for sharing of bio-specimens and data for research related to COVID-19. This document in tandem lays down the brief processes and operational mechanisms for establishing COVID19 biorepositories in the country.



Website link:
https://www.icmr.gov.in/cbiorn.html

ICMR releases guidance notes for evaluation of novel applications for COVID-19



ICMR has issued the guidance notes for evaluation of novel applications for COVID-19. Since the inception of the COVID-19 pandemic, ICMR has received over 190 requests for evaluation of molecules/AYUSH regimens/products/technologies/ diagnostic kits, etc. In view of ICMR's involvement in diagnosis, research, surveillance, clinical trials and validation of diagnostic kits for COVID-19, ICMR has partnered with various Science Departments like Department of Science & Technology (DST), Department of Biotechnology (DBT) and Council of Scientific & Industrial Research (CSIR) for evaluating the antiviral properties of investigational products/repurposed drugs/devices/technologies, etc.

Website link:
https://www.icmr.gov.in/cnaclaims.html

Dr Harsh Vardhan dedicates COBAS 6800 testing machine to the nation

Union Minister of Health & Family Welfare and Science & Technology, and Earth Sciences, Dr Harsh Vardhan, visited the National Centre for Disease Control (NCDC) and dedicated the COBAS 6800 testing machine to the nation. This is the first such automated diagnostic machine that has been procured by the Government for testing of COVID-19 cases and is installed at NCDC, New Delhi.

COBAS 6800 is a sophisticated machine enabled with robotics that minimizes the chance of contamination as well as the risk of infection to the healthcare workers since it can be operated remotely with limited human intervention. COBAS 6800 can also detect other pathogens like Viral Hepatitis B & C, HIV, MTb (both rifampicin and isoniazide resistance), Papilloma, CMV, Chlamydia, Neiserreia, etc.

Website link:
https://pib.gov.in/PressReleasePage.aspx?PRID=1623782

IJMR brings forth the second edition of special issue on COVID-19

Indian Journal of Medical Research (IJMR), a publication of ICMR, is a peer-reviewed online journal with monthly print-on-demand compilation of issues. The COVID-19 pandemic has created opportunities to build an improved response mechanism for future pandemics. Concerted, well-funded, comprehensive, planned, and all encompassing activities should facilitate building sustained institutional capacity to provide a swift and effective nationwide response to disease outbreaks. This could be done through access to appropriate technologies and improved logistics for efficient supply chains. These will also promote developing multi-sectoral stakeholder consortia

at national and state levels to coordinate actions and launch a comprehensive whole-of-the-society response to emerging infections.

Overall and long-term target should be to encourage and ensure convergence of all stakeholders for human health, animal health and environment to collaborate in implementing the One Health approach and protecting human life, reduce misery and avoid damage to the national economy. These are doable actions. The national will and determination are vital to mitigate the severe impact of pandemics, such as COVID-19 in India. India's COVID-19 Containment Strategy has been aligned with WHO's Strategic Preparedness and Response Plan for COVID-19. During the ongoing pandemic, India could successfully and rapidly scale-up several important interventions.

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION (DRDO)

DRDO builds 1000 bed Sardar Vallabhbhai Patel COVID Hospital including 250 ICUs

DRDO, along with Ministry of Home Affairs (MHA), Ministry of Health and Family Welfare (MoHFW), the Armed Forces, Tata Sons and other industry players has built Sardar Vallabhbhai Patel COVID Hospital, containing 1,000 beds with 250 intensive care units (ICU).

The unique centrally air-conditioned medical facility is spread over 25,000 square metres and is equipped with 250 ICU beds. Each ICU bed is equipped with monitoring equipment and ventilator. The infrastructure is built with negative internal pressure gradient for safe contagion containment. The facility has been engineered using rapid fabrication technique based on octanorm modules.

DRDO undertook the design, development and operationalisation of the facility on a war footing. With the permission from the Indian Air Force (IAF), land situated near the New Delhi Domestic Airport Terminal T1 was identified and construction work by DRDO commenced the 23rd of June at the site on Ulan Batar Road adjacent to Controller General of Defence Accounts (CGDA) Headquarters.

The hospital will be operated by medical team of doctors, nurses and support staff from the Armed Forces Medical Services (AFMS) while the facility will be maintained by the DRDO. Additionally, for the mental wellbeing of the patients, the hospital has a dedicated DRDO-managed psychological counselling centre.

The COVID-19 patients referred by the district administration will be admitted and treated free of cost at this facility. Critical cases will be referred to All India Institute of Medical Sciences (AIIMS), New Delhi.

The project has been funded with major contribution of Tata Sons. Other contributors are Bharat Electronics Limited (BEL), Bharat Dynamics Limited (BDL), Astra Microwave Products Limited (AMPL), Sri Venkateswara Engineers, Brahmos Private Limited, and Bharat Forge. Also, DRDO employees have voluntarily contributed their one day salary.

The hospital consists of a separate reception-cum-patient admission block, medical block with pharmacy and laboratory, duty doctors and nurses' accommodation and four modular patient blocks, each consisting of 250 beds. The corridor network has been designed to keep the patient's movement separate from the doctors and staff movement. Sanitation facilities and toilets are situated between the blocks for easy access to patients and facility personnel.

The patient blocks are self-sufficient with facilities for patients and medical care staff. Patient facilities include oxygen supply to each bed, x-ray, electrocardiogram (ECG), haematological test facilities, ventilators, COVID Test Lab, Wheel Chairs, Stretchers and other medical equipment. The DRDO-developed COVID-19 technologies mass produced by the Industry in the last 3 months such as ventilators, decontamination tunnels, personal protective equipment (PPEs), N95 masks, contact-free sanitizer dispensers, sanitisation chambers and medical robots trolleys will be utilised at the facility.

The facility will be secured with security staff, closed-circuit television (CCTV) surveillance and access control systems. The hospital is equipped with an integrated fire safety and control system. Environmental safety and waste disposal processes have been built in to the design of operations. A large parking area has been designated for staff, public, ambulances and fire-fighting services.

The hospital has been made operational from 05 July 2020, having been constructed in 12 days. Commissioning of this Hospital has contributed to an increase of 11 per cent additional COVID-19 beds in Delhi, thus overcoming the current critical situation.

Website link:
https://drdo.gov.in/photo-gallery/drdo-builds-covid-hospital-1000-beds
https://pib.gov.in/PressReleseDetailm.aspx?PRID=1636657

Impactful S&T efforts initiated in last quarter

DRDO developed crowd temperature monitoring system

A crowd temperature monitoring system has been developed using expertise in infrared imaging for missile applications. A DRDO lab, in collaboration with an industry partner, has innovated and developed algorithms for thermography in outdoor conditions. Advanced face

detection techniques have been used over thermal images. The system consists of a thermal camera and a desktop/laptop computer. Artificial Neural Network, trained with a very large in-house thermal database, allows face recognition directly on the running video from the IR thermal camera. A large number of people can be thermally profiled outdoors without disturbing their movements. Persons showing more than pre-set thermal threshold can be earmarked, recorded and real-time inputs can be given to authorities. The first system developed by DRDO using its hardware and software resources has already been deployed at the Hyderabad-based laboratory. Test results show that the system can be used in indoor environments as well as in areas where a large number of people may have to gather/move regularly.

Website link:
https://drdo.gov.in/crowd-temperature-monitoring-system

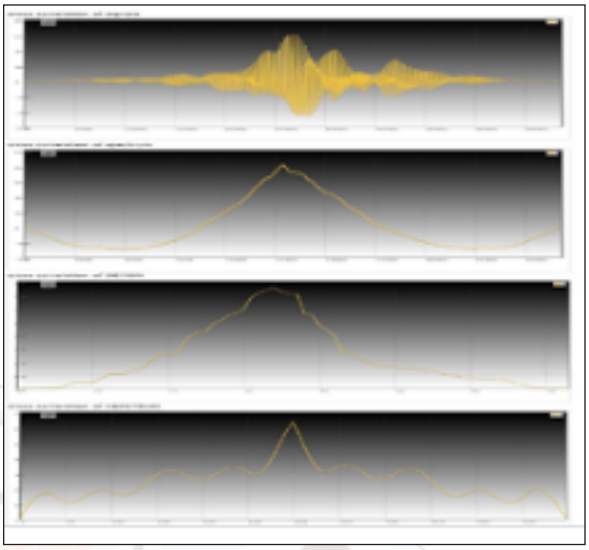
LASTEC developed portable UVC Killer system for disinfecting objects

A portable Ultra Violet C-band (UVC) virus killer system has been developed by Laser Science and Technology Centre (LASTEC), Delhi to disinfect various objects by inactivating bacteria and viruses 99.9999%. The device uses UVC Lamp of 254 nm wavelength as excitation source. Irradiance of 0.5 mW/cm² is created over the object for 2 minutes delivering a UVC dose of maximum 60 mJ/cm² (required 40 mJ/cm² to achieve 99.9999% inactivation). The system is very compact having dimensions 48 cm × 38 cm ´ 23 cm and weight of 6 kg only. It can sanitize office files, letters/envelops, laptop etc. As a safety feature the UV light turns OFF once the top cover is open. The user can do monitoring through acrylic window provided on side.

Website link:
https://drdo.gov.in/uv-based-disinfection-devices

NPOL came up with Acoustic Throat Infection Analyser (ATIA) to detect upper respiratory tract infections

Naval Physical and Oceanographic Laboratory (NPOL), Kochi has developed an Acoustic Throat Infection Analyser (ATIA) using acoustic data processing techniques used in defence applications. It aims to detect upper respiratory tract infections by non-invasive means of acoustic scanning of word(s) spoken by a person. It has been proven that the COVID-19 (SARS-CoV-2) virus infection develops initially in upper respiratory tract and detection of infection may give early information even before symptoms like fever etc. develops. For day-to-day office work, this could give non-contact screening of personnel entering an establishment.



Initially using a microphone connected to computer/mobile etc. voice samples for healthy person are recorded as per SOP and added in the data base. The recorded data is subjected to acoustic analysis techniques. For carrying out the analysis, signal processing techniques such as Spectrum analysis, Tonal analysis, Modulation and Phase analysis, Mel Frequency Cepstral Coefficients (MFCC) analysis are carried out to generate results for a person. At any point of time, live voice samples of a person can be compared with the database and distortion in voice due to throat infection is easily captured. The technique can have potential applications in hospitals/clinics, industries/offices and also in overall pandemic management. However, initial recording of voice samples is required.

Website link:
https://drdo.gov.in/acoustic-throat-infection-analyser-atia

DRDO developed MEDIDOOT, a medical trolley, to supply critical items to patients

Medidoot medical trolley is designed to supply critical items – food, cloth and medicine to the patients infected with contagions like the present SARS-CoV-2 in the isolation wards, thereby reducing the exposure of doctors and other healthcare staff to the infected area/patients. The trolley is remotely operated by a trained person to carry medical supplies to the designated patient in a remote location. It has closed enclosures to prevent cross contamination of the supplies and can be opened only by the operator remotely. There is a provision of two-way audio visual interaction between the patients and the medical team through the screen and microphone running either on Wi-Fi or standalone cellular network. It has the capability to sense obstacles and stop automatically in order to take care of the operational errors. The trolley is provided with an alarm to alert the patients when it reaches the destination. It has in-built short circuit protection mechanism for patient safety. Pilot light is provided to alert the people that the device is in operation and a battery charge level indicator is provided in the interface console. The trolley can be easily sanitized (Dry/Wet) post operation without removal of any of the components and hot swapping of the battery is possible for continuous operation of the trolley.

Website link:
https://drdo.gov.in/sites/default/files/inline-files/Medidoot.pdf

A fog-based personnel disinfection enclosure PerSan developed by DRDO

A sanitization enclosure called PerSan comprising of a chamber and a fog generator has been developed. The chamber is made from skeleton of steel pipes coated with epoxy or acrylic paint/powder or of UPVC pipes. The structure is covered, except the openings for entry and exit portions, using polythene film of 200-240µm, those normally used in poly-houses. The two openings, for entry and exit, are closed with either strip curtains or shower curtains. The assembly of the chamber is such that the base of the chamber is 1m x 1m and the height is 7 ft. The design enables assembly of the chamber in few hours. It is equipped with two fog generators of capacity of about 3 L/hour or single fog generator of capacity 5-6 L/hour. The fog generator is an ultrasonic transducer-based humidifier that generates fog of 1 to 5 µm aerosols. The system has important features, like, in-built reservoir tank for storage, solenoid valve with liquid level sensor for replenishment of the liquid in fog generation tank from the reservoir tank, IR (proximity) sensor in the power supply circuit of the fog generator, time selector for setting of time for fog generation from 15 s to 1 minute, etc. The fog generation tank dimension has been optimised to produce maximum fog. It uses more than 95% indigenous components.

Website link:
https://drdo.gov.in/personnel-vehicle-area-sanitization-equipment

DFRL developed Parakh, a mobile BSL-3 laboratory for COVID-19 testing

Defence Food Research Laboratory (DFRL) Mysore, pursuing the mission to support corona warriors, has developed a quick response asset to deal the situation arising due to contagious diseases including COVID-19 pandemic.

The Laboratory stationed on mobile platform has been named PARAKH. It provides unidirectional airflow and gradient negative room pressure with class III Biosaftey cabinet (BSC) for entry and safe processing of clinical samples. The viral inactivation and first 2 steps of viral lysis of RNA extraction are performed inside the BSC assuring personnel protection.

The lab facility is built on ISO 20 feet dry container and mounted on a chassis for mobility. The exhaust air, being HEPA (high efficiency particulate air) filtered, satisfies Class 10,000 or ISO7 air quality. Complete Heating Ventilation Air Conditioning (HVAC) is used to maintain desired unidirectional airflow and room pressure gradients of negative pressure as compared to the ambience.

The ingress of the samples is done in a safe way through a specifically designed dynamic pass box (as shown in the picture) for direct delivery inside the Class III biosafety cabinet for safe sample processing.

The facilities in the Lab include clean air workstation, cold chain for storing the reagents and samples, provision for treatment of liquid effluents, safe storage of solid biohazard wastes and

decontamination by autoclaving. Further, provision for storing and donning PPEs, storage for used aprons, emergency body shower and eye wash etc. have been provided.

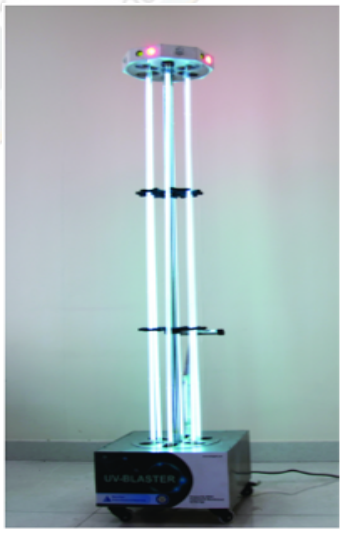
The Lab setup has necessary captive and raw power supply, space for sufficient fuel and water provisions and thus can be easily transported by road and deployed at the site of emergency as per the requirement. Air bellow suspension has been used to reduce the vibration during transport and air compressor for inflating tyres.

Autoclave & dynamic pass box facility have been provided for sample entry. The lab has been provided with Real-Time PCR detection platform specifically for COVID-19 testing. Medical Professional can easily and safely handle and preserve samples from disease outbreaks or during surveillance. The interior view of the mobile containment laboratory showing here are the Class III biosafety cabinet, real time PCR, PCR workstation, pass box, -20 degree Celsius freezer, refrigerator and incubator.

Real time PCR provided for COVID-19 screening from clinical samples can test about 300 samples per day. The Lab has been handed over to Viral Research and Diagnostic Laboratory (VRDL) of Mysore Medical College and Research Institute (the sole authorised COVID-19 testing facility in the Mysore region) to enhance their testing capability.

Website link:
https://drdo.gov.in/sites/default/files/inline-files/PARAKH%20-%20MOBILE%20BSL%203%20LABORATORY%20FOR%20COVID%20SAMPLES%20TESTING.pdf

DRDO developed UV Disinfection Tower for rapidly disinfecting infection-prone areas



DRDO has developed an Ultra Violet (UV) Disinfection Tower for rapid and chemical-free disinfection of high infection-prone areas. The equipment named UV blaster is a UV-based area sanitizer designed and developed by Laser Science & Technology Centre (LASTEC), the Delhi based premier laboratory of DRDO with the help of M/s New Age Instruments and Materials Private Limited, Gurugram.

UV Blaster is useful for high-tech surfaces like electronic equipment, computers and other gadgets in laboratories and offices that are not suitable for disinfection with chemical methods. The product is also effective for areas with large flow of people such as airports, shopping malls, metros, hotels, factories, offices, etc. The UV-based area sanitizer may be used

by remote operation through laptop/mobile phone using Wi-Fi link. The equipment has six lamps, each with 43 watts of UV-C power at 254 nm wavelength for 360 degree illumination. For a room of about 12 x 12 feet dimension, the disinfection time is about 10 minutes and 30 minutes for 400 square feet area by positioning the equipment at different places within the room. This sanitizer switches off automatically on accidental opening of room or human intervention. One more salient safety feature of the product is the key-to-arm operation.

Website link:
https://pib.gov.in/PressReleasePage.aspx?PRID=1620919

RCI, Hyderabad designed low-cost portable ventilator - DEVEN

RCI, Hyderabad has designed a low-cost portable ventilator which is the need of the hour. The new ventilator designed by DRDO scientists has been named "DEVEN" (DRDO Economic VENtillator). It is a micro-controller-based design with electronically controlled solenoid valves. It has CMV (continuous mandatory ventilation) as well as pressure support modes of operation. There are no mechanically moving parts in this ventilator and hence high reliability is ensured in comparison to other low cost AMBU (artificial manual breathing unit) bag-based ventilator designs.

Website link:
https://www.drdo.gov.in/sites/default/files/whats_new_document/attach2.pdf
https://www.drdo.gov.in/labs-and-establishments/research-centre-imarat-rci

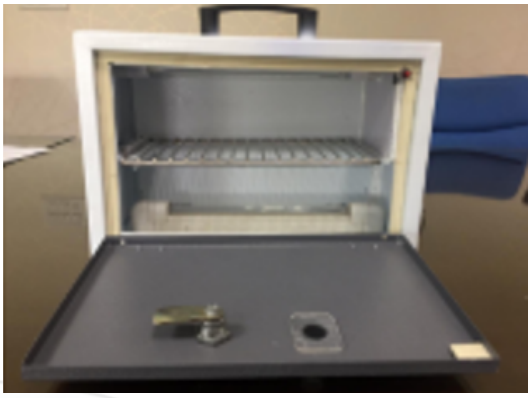
DRDO presented two new products to enable COVID-19 disinfection process

DRDO, in its continuous quest to contribute towards the fight against COVID-19, has been developing several solutions from its existing arsenal of technologies and experience. These consist of novel innovations and some others in which products will be quickly configured to suit present requirements. DRDO has introduced two products which can enhance the operations at public places during the outbreak of COVID-19 pandemic.

Automatic Mist-based Sanitizer Dispensing Unit: Centre for Fire Explosive & Environment Safety (CFEES), Delhi along with HPO 1, using its expertise in mist technology for fire suppression, has developed automatic mist-based sanitizer dispensing unit. It is a contactless sanitizer dispenser which sprays alcohol-based hand rub sanitizer solution for sanitising hands while entering the buildings/office complexes, etc. It is based on water mist aerator technology, which was developed for water conservation.

UV Sanitisation Box and Hand-held UV device: Defence Institute of Physiology & Allied Sciences (DIPAS) and Institute of Nuclear Medicine & Allied Sciences (INMAS), DRDO laboratories in Delhi have designed and developed Ultraviolet

C Light-based sanitisation box and handheld UV-C (ultraviolet light with wavelength 254 nanometres) device. The UV-C consists of a shorter, more energetic wavelength of light. It is particularly good at destroying genetic material in COVID-19. The radiation warps the structure of the RNA, which prevents the viral particles from making more copies of themselves. The UV-C kills microbes quickly. Sanitisation of the items by employing UV-C light avoids the harmful effects of two chemicals used for disinfection. This is environment friendly and is a contact-free, effective sanitisation method. The UV-C box is designed for disinfecting personal belongings like mobile phones, tablets, purse, currency, the cover of office files, etc.



Website link:
https://pib.gov.in/PressReleseDetailm.aspx?PRID=1615331

DRDO developed equipment for effective sanitisation of public spaces

In the continuing quest for developing indigenous solutions to combat the Coronavirus Pandemic, the DRDO is ready with technologies for sanitising areas of different sizes. The Centre for Fire Explosive & Environment Safety (CFEES), Delhi has developed two configurations of sanitising equipment. These are spinoffs from technologies developed for fire suppression applications.

Portable Backpack Area Sanitisation Equipment: CFEES, with the help of its industry partner, has developed portable sanitisation equipment for spraying decontamination solution consisting of one per cent Sodium Hypochlorite (Hypo) solution for sanitisation of the suspected area. The portable system can be mounted as a backpack and can be carried by the operations personnel. This system incorporates low-pressure twin fluid (air & disinfectant liquid) technology to generate very fine mist. The system is capable of disinfecting up to 300 square metre area. The application areas can include hospital reception, doctors' chambers, office spaces dealing with the general public, corridors, pathways, metro and railway stations, bus stations, etc.

Trolley-mounted Large Area Sanitisation Equipment: The system incorporates low-pressure single fluid (disinfectant liquid) technology generating very fine mist. It is capable of disinfecting up to 3,000 square metres of area. It has a tank capacity of 50 litres and has a lancing (throw) distance of 12-15 metres. This is useful for disinfecting hospitals, malls, airports, metro stations, isolation areas, quarantine centres and high-risk residential areas.

Website link:
https://pib.gov.in/newsite/PrintRelease.aspx?relid=200967

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY (MeitY)

Impactful S&T efforts initiated in last quarter

Global Partnership on Artificial Intelligence (GPAI) has been formed to leverage AI towards COVID-19 mitigation

India, Australia, Canada, France, Germany, Italy, Japan, Mexico, New Zealand, the Republic of Korea, Singapore, Slovenia, the United Kingdom, the United States of America, and the European Union have come together to create the Global Partnership on Artificial Intelligence (GPAI or Gee-Pay). GPAI aims to support the responsible and human-centric development and use of AI in a manner consistent with human rights, fundamental freedoms, and their shared democratic values, as elaborated in the OECD Recommendation on AI. To this end, GPAI also look forward to working with other interested countries and partners.

GPAI is an international and multi-stakeholder initiative to guide the responsible development and use of AI, grounded in human rights, inclusion, diversity, innovation, and economic growth. In order to achieve this goal, the initiative will look to bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities.

In collaboration with partners and international organizations, GPAI will bring together leading experts from industry, civil society, governments, and academia to collaborate across four Working Group themes: 1) Responsible AI; 2) Data Governance; 3) The Future of Work; and 4) Innovation & Commercialization. Critically, in the short-term, GPAI's experts will also investigate how AI can be leveraged to better respond to and recover from COVID-19.

GPAI will be supported by a Secretariat, to be hosted by the OECD in Paris, as well as by two Centres of Expertise – one each in Montréal and Paris. The relationship with the OECD will bring strong synergies between GPAI's scientific and technical work and the international AI policy leadership provided by the OECD, strengthening the evidence base for policy aimed at responsible AI. The Centres will provide administrative and research support for the practical projects undertaken or assessed by Working Group experts from various sectors and disciplines. The Centres will also plan the annual GPAI Multi-stakeholder Experts Group Plenary, the first of which will be hosted by Canada in December 2020.

Website link:
https://meity.gov.in/writereaddata/files/Joint_Statement_on_Launch_GPAI.pdf

MeitY announced call for proposal to conduct ICT Grand Challenge to build suitable Work from Home (WFH) products and solutions

The Ministry of Electronics & Information Technology (MeitY) announces to develop innovative software product by organizing 1st ICT Grand Challenge through implementing agency in the specified areas. The objective of ICTGC is to generate innovative technology/ solutions in the form of software products using emerging technology so as to address the COVID/social economic challenges and have potential for mass market leading to greater access of the products in a cost-effective manner. More scheme details of ICT Grand Challenge under National Policy on Software Products (NPSP) are available in the detailed document.

Broad area of call for proposal: The implementation agency is expected to prepare the detailed plan as per ICTGC scheme document for selecting the right Start-ups/MSMEs that have the potential to build the suitable Work from Home (WFH) products/solutions enabling employees to work and execute tasks remotely for seamless operations/business continuity of organizations in fully secure and reliable environment.

Contact Info: ispr@meity.gov.in

Website link:
https://ispr.gov.in/ictgc/documents.php

Innovation challenge announced by MeitY for development of a video conferencing solution

COVID-19 has thrown unprecedented challenges for the world and industries alike. While we continue to fight these challenges as a nation amidst business disruptions and remote working scenarios, it is important for all including governments, industry and individuals to contribute with all its might to overcome the present and emerge stronger as humanity. Government of India is taking all necessary steps to ensure that we are prepared well to face the challenge and overcome threats posed by the pandemic. In light of these developments, the Ministry of Electronics & Information Technology announces an Innovation Challenge for Development of a Video Conferencing

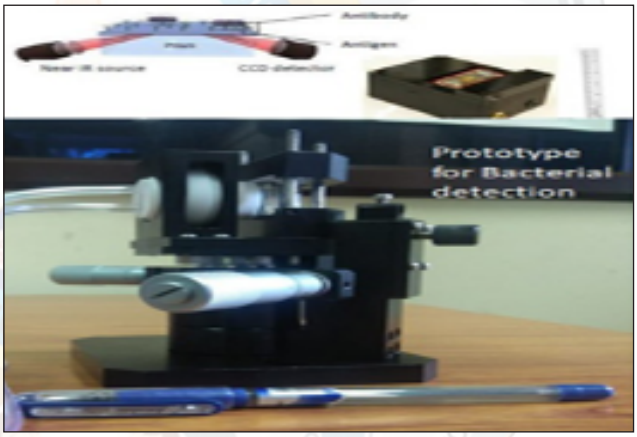
Solution under the Digital India Initiative. The Innovation Challenge is open for participation from industry, start-ups and individual experts.

The end-product will be Indian software at par with international quality and should work in low and high network scenarios. The initiative is an attempt to promote Indian software products as envisaged under the National Policy on Software Products.

In an attempt to provide initial market the winning team with the best-judged solution will get a contract to deploy their solution for use by Government of India and State Government entities for a period of 4 years and will also be given Rs. 1 crore in the first year and an additional 37 Rs. 10 lakhs per year for 3 years after the first year towards operations and maintenance of the solution for the Government. In addition, all teams including the winning team shall be free to market the product to any entity outside Union/State/UT Government Organizations of India by hosting it on an environment other than that for the Government. Details are available on MeitY Website as well as on MyGov Portal.
Contact Info: meity-sthub@gov.in

Website Link:
https://startups.meitystartuphub.in/public/application/inc/5e92ec1269e3401cd7bc6db7

CMET-MeitY developed cost-effective portable plasmonic sensor for random testing of novel coronavirus at the community level



Centre for Materials for Electronics Technology (CMET), Thrissur, Kerala, under the aegis of scientific society of *Ministry of Electronics and Information Technology (MeitY),* has developed a point-of- care plasmonic portable sensor with disposable semiconductor-based chips to detect antibody with the presence of COVID-19 virus in the blood. The sensor was tested for food-borne pathogens by Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram. Functionalization of the sensor and the docking efficiency analysis are being carried out on the designed bio-receptors with different pathogenic strains. First version of the biosensor is under validation at RGCB. This technology is now being modified for antibody testing in blood for COVID-19 patients. Such portable devices would be beneficial for the random testing of patients at an affordable cost.

Website link:
https://meity.gov.in/content/c-met

MeitY supported SAMHAR-COVID19 initiative, a supercomputing model of healthcare analytics based research for combating COVID-19

C-DAC has launched SAMHAR-COVID19 in partnership with National Supercomputing Mission (NSM) Consortia Members, Startups and Industries, to build a Rapid Supercomputing System and Research Community for India to fight COVID-19. It is proposed to create a Consortium of

researchers as virtual 'Rapid Researchers Task Force (RRTF), SAMHAR-COVID19.' The initiative is partnered and co-supported by Ministry of Electronics and Information Technology (MeitY).

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Website link:
https://www.cdac.in/

Strip-based hand-held electrochemical point-of-care testing for COVID-19

Globally, the strip-based test is not available for COVID-19 diagnostics. Electrochemical biosensors technology has been developed and transferred by Indian Institute of Technology (IISc), Bengaluru to its startup, PathShodhan and now field deployed to measure multiple biomarkers. This technology is now proposed to be redesigned and validated to test COVID-19. PathShodh's existing platform technology, 'anuPath™', a multi-analyte lab on palm will be used along with low cost disposable test strips utilizing a novel receptor chemistry, to perform highly accurate and sensitive COVID-19 antibody (IgG and IgM) test. The test can be done with a tiny finger prick blood sample within 5 minutes, in a substantially lower cost than that with ELISA kit. Tentative cost at full-scale production will be about Rs 600 per test. The initiative is supported by Ministry of Electronics and Information Technology (MeitY).

Contact info: vinay.k@pathshodh.com; navakanta@iisc.ac.in

Website link:
https://pathshodh.com/media.php

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

MINISTRY OF AYUSH

Impactful S&T efforts initiated in last quarter

Dr Harsh Vardhan launched 'Ayush Sanjivani' app and inter-disciplinary studies involving AYUSH interventions for COVID-19

Dr Harsh Vardhan, Union Health & Family Welfare Minister launched the 'AYUSH Sanjivani' App and two AYUSH-based studies related to COVID-19 situation on 7th May, 2020 in the presence of Shri Shripad Yesso Naik, MoS (I/c), AYUSH who participated through Video Conferencing from Goa.

Highlighting the importance of harnessing technology for COVID-19 response, the Union Health Minister said "The 'AYUSH Sanjivani' mobile app, which has been launched today, will help to generate data on acceptance and usage of AYUSH advocacies and measures among the population and its impact in prevention of COVID 19. It is developed by Ministry of AYUSH and MeitY and shall reach out to a target of 50 lakh people."

Dr Harsh Vardhan stated that COVID-19 management has provided a potent platform for alliance between MoHFW, MoAYUSH and technology organisations such as CSIR, ICMR, and UGC to not only develop AYUSH interventions and solutions but also help in promoting AYUSH knowledge for the larger good of the global community. These organisations are joining hands today and are being supported and guided by ICMR and DCGI in propagating the wholesomeness and holistic health benefits of the age-old traditional medicinal knowledge of Ayurveda, he added.

In addition to the App, Dr Harsh Vardhan also launched two more scientific studies. One is the collaborative clinical research study on Ayurveda interventions as prophylaxis and as an add-on to standard care to COVID 19, which shall be a joint initiative of Ministry of AYUSH, MoHFW and the Ministry of Science & Technology through Council of Scientific & Industrial Research (CSIR) with technical support of ICMR. The Interdisciplinary Ayush R&D Task Force headed by Dr Bhushan Patvardhan, Vice Chairman, University Grant Commission (UGC) has formulated and designed clinical research protocols for prophylactic studies and add-on interventions in COVID-19 positive cases

through thorough review and consultative process of experts of high repute from different organisations across the country for studying four different interventions, viz., Ashwagandha, Yashtimadhu, Guduchi Pippali and a poly herbal formulation (AYUSH-64). This includes the following two areas:

a. Ashwagandha for the Prophylaxis against SARS-COV-2 in subjects with increased risk during the COVID 19 Pandemic:A comparison with Hydroxychloroquine in the healthcare providers and
b. Effectiveness of Ayurveda Formulation as an adjunct to 'Standard of Care' for the Treatment of Mild to Moderate COVID-19: A Randomized, Open Label, Parallel Efficacy, Active Control, Multi-Centre Exploratory Drug Trial.

Dr Harsh Vardhan also launched the population-based interventional studies on impact of AYUSH-based prophylactic interventions for prevention of COVID-19 infection in high risk population. The core objectives comprise of assessment of preventive potential of AYUSH interventions for COVID-19 and to assess the improvement in quality of life in high risk population. The study will be carried out through four Research Councils under Ministry of AYUSH and National Institutes in 25 states across the country and several State Governments covering approximately 5 lakh people. The outcome of the study is expected to pave a new horizon in understanding the preventive potential of AYUSH interventions during pandemics like COVID-19 through scientific evidence.

Elaborating on the import of these studies, Dr Harsh Vardhan stated that these studies shall re-establish the importance of AYUSH pathies with the help of rigour of CSIR, ICMR and DCGI. "This is truly a momentous day. The technology alliance provides valuable opportunity for such knowledge-based solutions to continue to benefit us even after the COVID-19 pandemic has passed, by possible integration of AYUSH in the mainstream scientific efforts," he added. "Let us also understand that the modern pathies of medicine and science are not in competition with those of AYUSH, but they complement and strengthen each other in intrinsic ways," Dr Harsh Vardhan stated. "Under the leadership of our beloved Prime Minister, AYUSH advisories for enhancing immunity during COVID-19 pandemic have been acknowledged the world over," he said.

Shri Rajesh Bhushan, OSD/Secretary (HFW), Shri Vaidya Rajesh Kotecha, Secretary, AYUSH, Dr Shekhar C. Mande, Director General, CSIR, Dr V. G. Somani, Drugs Controller General of India, and other senior officers of MoHFW and AYUSH were also present at the launch event.

Ministry of AYUSH issued advisory for meeting the challenge arising out of spread of Novel Coronavirus in India

The holistic approach of AYUSH systems of medicine gives focus on prevention through lifestyle modification, dietary management, prophylactic interventions for improving the immunity and simple remedies based on presentations of the symptoms.

For instance, emphasis on avoidance of causative factors and enhancing the immunity against host of infections are characteristics of Ayurveda management. The preventive aspect of Homoeopathy is well known, and historically, Homoeopathy has reportedly been used for prevention during the epidemics of Cholera, Spanish Influenza, Yellow fever, Scarlet fever, Diphtheria, Typhoid etc. The Genus Epidemicus (GE) is the remedy found to be most effective for a particular epidemic once data have been gathered from several cases. It was reported that, during recent past GE had been used during various disease outbreak for preventing the spreading of diseases like Chikungunya, Dengue Fever, Japanese Encephalitis and Cholera with good results.

The AYUSH approach to manage the outbreak broadly comprise of:

- Preventive and prophylactic;
- Symptom management of COVID-19 like illnesses; and
- Add on interventions to the conventional care.

Website Link:
https://www.AYUSH.gov.in/docs/125.pdf

Notification issued for undertaking research on COVID-19 through Ayurveda, Unani, Siddha and Homoeopathy systems by Ministry of AYUSH

IIn the wake of COVID-19 caused by SARS CoV-2, there has been surge in proposals received by Ministry of AYUSH claiming possible treatment of COVID-19. At present, there is no approved treatment for COVID-19 infection. Indian Traditional Medicines have wide potential for usage in such conditions owing to their longstanding use in the community, huge number of ancient references and large number of publications in scientific journals on their phyto-chemical constituents, mode of action, clinical efficacy etc. At the same time, it is also essential to have scientific evidence on use of any Ayurveda, Unani, Siddha or Homeopathy formulation on prevention/ management of COVID-19. Therefore, it is felt necessary to make serious efforts for development of drugs based on any of AYUSH systems recognized under Drugs and Cosmetics Act, 1940.

There are no specific regulatory provisions in the Drugs & Cosmetics Rules 1945, for conduct of clinical trials of Ayurveda, Siddha, Unani and Homeopathy drugs. At the same time it is also necessary that the clinical data generated is scientifically valid and credible. In this context the Ministry has undertaken consultation with DCGI, CDSCO as well as other research experts.

In the above background and based on the consultation of CDSCO, the Ministry of AYUSH with the approval of Minister of State Independent Charge of AYUSH notifies that the scientists, researchers, clinicians of any of recognized systems of medicine under IMCC Act 1970, HCC Act 1973 and NMC Act 2019 (formerly IMC Act 1956) can undertake research on COVID-19 through Ayurveda, Siddha, Unani and Homeopathy systems including prophylactic measures, intervention during the quarantine, asymptomatic and symptomatic cases of COVID-19, public health research, survey, lab-based research etc. to generate evidence.

While undertaking research, it is mandatory for the organizations to comply with the following conditions:

- The proposal should be approved by their scientific advisory bodies and Institutional Ethics Committees.
  If it is clinical trial, the project should be registered with CTRI.
- The sample size should be based on statistical justification.
- The clinical research should be conducted as per AYUSH guidelines for Clinical Research or ICMR guidelines.
- It should comply with relevant regulations for Bio-medical and Health Research.
- It should comply with Good Clinical Practice Guidelines.
- It should comply with National Ethical Guidelines for Bio-medical and Health Research on Human Participation published by ICMR.
- It should comply with any other relevant regulations in force.
- AYUSH registered practitioner/expert should be part of the study team at each site.

Website link:
https://www.AYUSH.gov.in/docs/127.pdf

Ayurveda's immunity boosting measures for self-care during COVID-19 crisis

In the wake of the COVID-19 outbreak, entire mankind across the globe is suffering. Enhancing the body's natural defence system (immunity) plays an important role in maintaining optimum health.

We all know that prevention is better than cure. While there is no medicine for COVID-19 as of now, it will be good to take preventive measures which boost our immunity in these times.

Ayurveda, being the science of life, propagates the gifts of nature in maintaining healthy and happy living. Ayurveda's extensive knowledge base on preventive care derives from the concepts of "Dinacharya" - daily regimes and "Ritucharya" - seasonal regimes to maintain healthy life. It is a plant-based science. The simplicity of awareness about oneself and the harmony each individual can achieve by uplifting and maintaining his or her immunity is emphasized across Ayurveda's classical scriptures.

Ministry of AYUSH recommended a series of self-care guidelines for preventive health measures and boosting immunity with special reference to respiratory health. These are supported by Ayurvedic literature and scientific publications.

Website link:
https://www.AYUSH.gov.in/docs/123.pdf

Tentative proposed list of projects related to COVID-19 to be funded by Ministry of AYUSH

Ministry of AYUSH has shortlisted eight projects to be funded which are related to COVID-19. The research activities would be in concordance with interventional studies, drug trials, efficacy evaluation and impact assessment. Following are the titles of the proposed projects.

- Clinical research studies on Ayurveda interventions as prophylaxis and as an add-on to standard care to COVID-19: Collaborative clinical studies as a joint initiative of Ministry of AYUSH, Ministry of Health and Family Welfare (MoHFW) and the Ministry of Science & Technology through Council of Scientific & Industrial Research (CSIR) with technical support of ICMR.
- Population-based interventional studies on impact of AYUSH based prophylactic interventions.
- Ayush Sanjivani application-based study for impact assessment of acceptance and usage of AYUSH advisories in its role in prevention of COVID-19.
- Drug Trial to Evaluate Efficacy and Safety of an Ayurvedic Formulation AYUSH-64 as Adjunct Treatment to Standard in COVID-19.
- Evaluation of Efficacy and Safety of Ayurveda Intervention (Ayush-64) add-on therapy for patients with COVID-19 infection (Stage I)-A Randomized controlled clinical trial.
- Evaluation of the efficacy of an Ayurvedic intervention (Chyawanprash) in the prevention of COVID-19 among healthcare personnel.
- Impact of Ayurvedic Interventions in prevention of COVID-19 infection in identified containment area.
- Interventional study on the effect of AYUSH as a prophylactic measure among high risk population (Healthcare workers/containment zone population) exposed to COVID-19.

Website link:
https://health.ncog.gov.in/ayush-covid-dashbaord/#

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

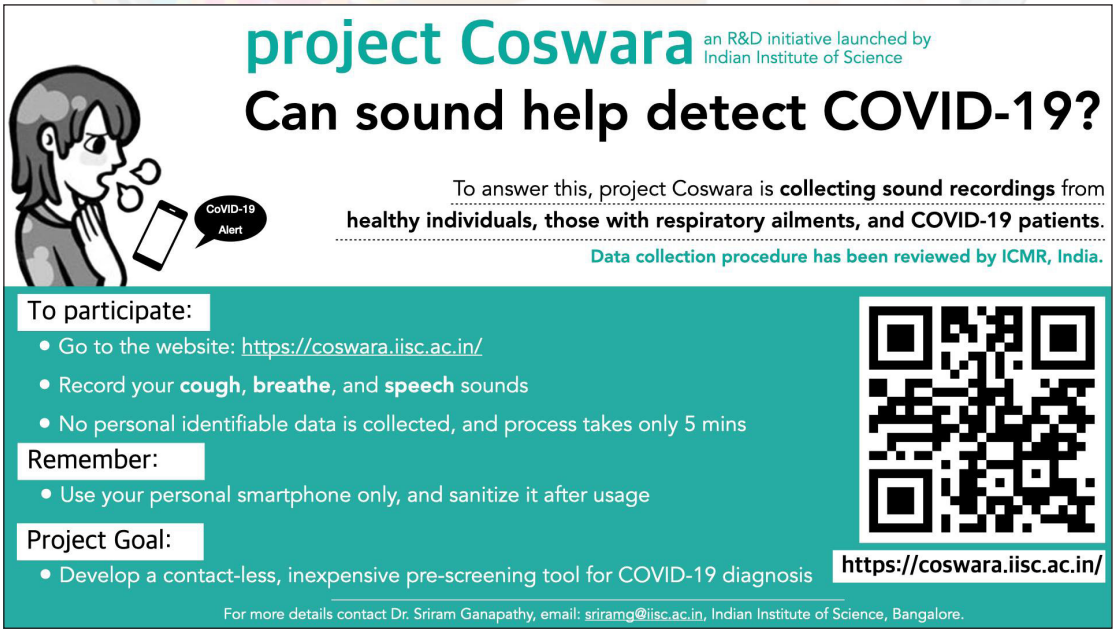
BY

SCIENTIFIC AND ACADEMIC INSTITUTIONS

Coswara: Speech and sound-based diagnostics developed by IISc to diagnose COVID-19

One of the most common symptoms of COVID-19 is persistent dry cough, with others including presence of respiratory sputum (phlegm) and shortness of breath. A real- time RT-PCR test is the most commonly deployed test currently for COVID-19 with testing results available after several hours. As the pandemic is growing, the development of simplistic, cost-effective and fast testing for the infection has become a crucial component in healthcare, policy making and economic revival of several countries. To address the challenge, Indian Institute of Science (IISc) has initiated a project, 'Coswara.'

Coswara attempts to provide a simple tool for diagnostics of COVID-19 based on respiratory, cough and speech sounds. As the major symptoms of the disease include respiratory problems, the proposed project aims to detect and quantify the biomarkers of the disease in the acoustics of these sounds. The project requires participants to perform a recording of breathing sounds, cough sounds, sustained phonation of vowel sounds and a counting exercise. The entire response requires about 5 minutes of recording time. Along with these recordings, the tool also records the patient's health status (without any personally identifiable information) as well as age, gender and location. The audio dataset collected will be released for researchers across the world to develop a potential diagnostic tool using signal processing and machine learning methods.



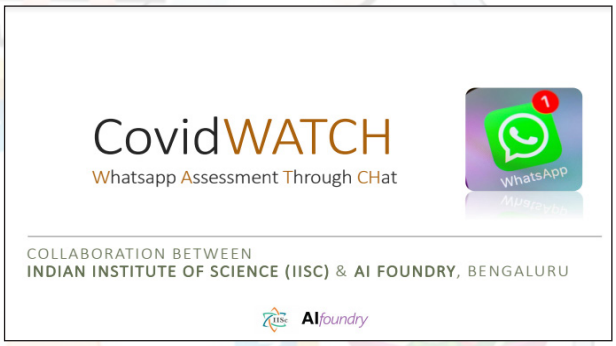
The project is in the data collection stage and will go through an experimental validation before obtaining full approval as a potential diagnostic tool. Given the highly simplistic and cost-effective nature of the tool, it has been hypothesized that even a partial success for the tool would enable a massive deployment as a first line diagnostic tool for the pandemic. The project is not aimed to replace the chemical testing or the imaging methods but to merely supplement those with a cost-effective, fast and simple technique.

The webpage for data collection: https://record.coswara.iisc.ac.in/

Contact Info: Sriram Ganapathy; sriramg@iisc.ac.in

Website link:
https://covid19.iisc.ac.in/coswara-speech-and-sound-based-diagnostics/

CovidWATCH: Rapid monitoring tool for regions with low smartphone penetration



CovidWatch is a rapid monitoring tool developed for areas with low smartphone penetration. It offers a basic screening test based on ICMR strategy and a symptom tracker to record daily symptoms, via multi-language Whatsapp chatbot. Specifically built for people with little to no technological acumen, it also allows a single volunteer to take this test on behalf of multiple nearby people for convenience. The data is shared with the authorities in the form of a dashboard, where it is filtered based on location, symptoms, age, etc. for subsequent follow-ups. This tool has been deployed in a ward under Pune Municipality and has already helped authorities by surveying close to 3,000 people in approximately 2 weeks.

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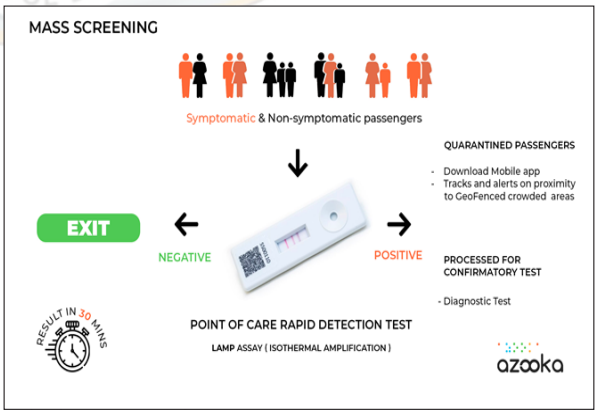
Website link:
https://covid19.iisc.ac.in/covidwatch-rapid-monitoring-tool-for-regions-with-low-smartphone-penetration/

Rapid point-of-care test for mass surveillance at public transit systems

A Rapid Screening Test for Point-of-care Diagnostics has been developed by a team at IISc, Bengaluru. It has an isothermal amplification-based lateral flow detection approach that can be used in low resource settings and produces results in only 30-90 minutes. The main idea is to manage and control community infection and spread via mass screening tests that can be used at entry and exit points at airports, railways, and other mass transit systems.



The detection system does NOT require PCR or RT-PCR devices or any specialized medical staff or training. This has three steps:

1. One-step RNA extraction kit to extract RNA samples and keep it intact;
2. LAMP Assay for Isothermal Amplification that requires a heatblock; and
3. Lateral Flow Assay for Visual Confirmation which works similar to a pregnancy test.

Contact Info: Fathima Benazir; hello@azooka.life

Website link:
https://covid19.iisc.ac.in/rapid-point-of-care-test-for-mass-surveillance-at-public-transit-systems/

IISc developing Sero-CoV-ID to detect SARS-CoV-2-specific antibodies

Serology assays that detect infection-specific antibodies in the serum of an individual are an effective surveillance method to understand the level of spread of infection in a population. SARS-CoV-2 virus transmission identified at 40-80% of asymptomatic cases makes it difficult to estimate the progression of pandemic without serology tests. Seroprevalence testing by protein/peptide-based ELISA is a cheap method to understand disease spread.

A team at IISc, Bengaluru has developed two distinct variants of indirect ELISA tests to detect SARS-CoV-2-specific antibodies. The assay employs SARS-CoV-2-specific antigen or peptides for detection. The COVID-19-specific antibody in the blood of an individual binds with the antigens immobilized on the microwell and can be detected using antibody against human IgG/IgM antibodies. Their initial test results with COVID-19 antigen shows 100% specificity and 85% sensitivity (at 12-15 days after onset of symptoms). The peptide-based ELISA assay also has 100% specificity albeit with poorer sensitivity (50%) but is half the cost of protein assays. The team is working on improving both of these tests further and validating them with additional samples.

This project is a collaboration between IISc, Bangalore Medical College (BMC), St. John's Research Institute (SJRI), and TIFR Centre for Interdisciplinary Sciences (TCIS). Initial support for this work has been provided by Capgemini through the Corporate Social Responsibility scheme and facilitated by the Office of Development and Alumni Affairs (ODAA) at IISc and the Principal Scientific Adviser's office, GoI.

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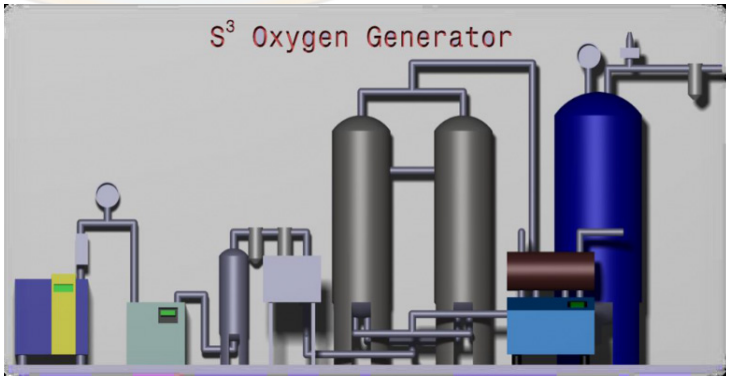
Website link:
https://covid19.iisc.ac.in/sero-cov-id/

IISc designs S3 medical oxygen generator to combat COVID-19

The Gasification group at IISc, which specializes in low pressure multi-species gas separation, has developed an oxygen generation system for small-scale medical requirements. The process uses low power and meets the specifications as per the Ministry of Health and Family Welfare (MoH&FW).



The process draws ambient air through a compressor along with an air conditioning system to remove any contaminants in the air before the separation. The oxygen separation takes place within a twin-bed Vacuum Swing Adsorption system integrated with a small storage volume as a discharge vessel and various safety systems. The equipment-build material and the oxygen produced fulfil the gas quality requirements as prescribed by Indian Pharmacopeia and can be used in ICU/CCU/OT and other clinical wards. The choice of materials for the equipment meets the prescribed standards.

Website link:
https://covid19.iisc.ac.in/s3-medical-oxygen-generator/

Impactful S&T efforts initiated in last quarter

Expert database for research on COVID-19 pandemic from the Science Academies of India

The three Science Academies of India - National Academy of Sciences, India (NASI), Indian Academy of Sciences (IASc) and Indian National Science Academy (INSA) - have jointly drawn on a list of experts/scientists/fellows of the academies, who have volunteered to participate and assist with planning/decision/research addressing the challenges posed by COVID-19. They will be willing to participate, review and assist with any of the programmes in the domains of their expertise.

The lists of scientists are from the following areas of expertise:

- Basic Science;
- Data Analytics and Modelling;
- Therapeutics and Repurposing of Medicines;
- Design and Manufacture of Protective Gear;
- Rapid Manufacture of Test Kits;
- Rapid Manufacture of Instruments including Ventilators; and
- Rapid Validation of Drug.

Contact info: AcademiesExperts@gmail.com

Website Link:
http://insaindia.res.in/scroll_news_pdf/experts.pdf

IISc successfully completes prototyping of PRAANA ventilator

Indian Institute of Science (IISc) successfully completed the prototyping of an indigenously developed ICU-grade ventilator. Built using a custom designed pneumatic system controlled by a microprocessor, it uses proprietary 30 algorithms and techniques to blend air and oxygen in the desired ratio. It also has fine-grained control of patient-side respiratory parameters such as respiration rate, inspiration to expiration ratio, FiO_2, and PEEP. It supports both invasive and non-invasive ventilation. The ventilator uses only components made in India or easily available in the domestic supply chains. The

team took about 35 days to go from the drawing board to a proof-of-concept system and then a working prototype in another two weeks.

Website Link:
https://www.iisc.ac.in/events/iisc-team-successfully-completes-prototyping-of-praana-ventilator/

KAWACH mask, a product of IIT Delhi start-up ETEX boosting employment and making people Atmanirbhar

Indian Institute of Technology Delhi (IITD) start-up ETEX has launched affordable and effective facemask, KAWACH, to provide protection against COVID-19. KAWACH mask is a multilayer textile innovation for optimum protection at an affordable rate (Rs. 45 only), 98% Filtration protection against 3 µm (micron) and 90% against 0.3 µm (micron). Ultra-soft fibrous lightweight material (<15 g) and advanced knitting technology have been used to give extra comfort to the wearer. Its 3D-fit design, as par with N95, allows maximum face covering for protection. The mask has also been tested and approved by the NABL-accredited lab using international standards (ASTM F2299, ASTM F2101, IS 16289:2014, ASTM F1862/F1862M-13, 16 CFR Part-1610). KAWACH is primarily made from biodegradable materials to save the environment. Within six weeks of launching the highly protective and affordable "Make in India" mask 'KAWACH', ETEX has scaled up production to ensure that the mask reaches the masses to protect them against COVID-19. So far, over a million masks have been distributed across the country.

Website Link:
https://home.iitd.ac.in/press-kawach.php

Visvesvaraya National Institute of Technology developed Sahayak Robot for healthcare corona warriors

Visvesvaraya National Institute of Technology (VNIT), Nagpur, has developed a robot named 'Sahayak' to help in fighting the coronavirus pandemic. Considering frontline workers like doctors and nurses in the hospital are at the highest risk of getting infected, the team of

researchers at 'IvLabs,' the robotics lab of VNIT, converted a hospital trolley into an automated robot that can be wirelessly controlled. Such a robot can be used by the hospital staff to deliver food packets and medicines to the COVID-19 patients and maintain a safe distance. The robot is also equipped with a display screen, camera, and a speaker which can be used by the doctors for video communication with the patients.

Website Link:
http://vnit.ac.in/students-of-vnit-have-developed-a-robot-named-sahayak-to-help-in-fighting-the-coronavirus-pandemic/

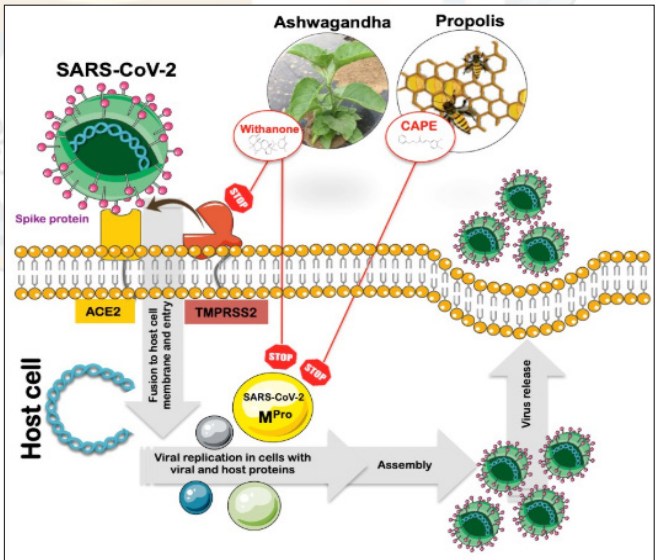
IIT Bhubaneswar developed Patient Responsive Active Assist coNtrol (PRAAN) Ventilator

Indian Institute of Technology Bhubaneswar (IITBBS) has developed a Patient Responsive Active Assist coNtrol (PRAAN) ventilator for COVID-19 emergencies. It can be operated in the standard volume control mode by setting breaths-per-minute, inhale and exhale time ratios, and tidal volume. The LCD displays various control clinical parameters and features fault alarms. Some of the critical structural members have been 3D printed. The highlight of this PRAAN ventilator is its active assist control mode. In this mode of operation the ventilator senses that the patient is trying to inhale and will adapt to the patient's breathing frequency, reducing the load on the lungs. This feature has been realised in the ventilator without significant increase in cost.

Website link:
https://www.iitbbs.ac.in/development-of-a-patient-responsive-active-assist-control-praan-ventilator-at-iit-bhubaneswar.php

Ashwagandha emerges as Mother Nature's COVID-Warrior

A collaborative research study by DBT-AIST International Laboratory for Advanced Biomedicine (DAILAB) at Indian Institute of Technology Delhi (IITD) and National Institute of Advanced Industrial Science and Technology (AIST), Japan has recently discovered that Ashwagandha may hold an efficient anti-COVID-19 drug. This study has given a boost to the recent initiative of the Government of India in forming an Interdisciplinary Task Force (joint initiative of Ministry of AYUSH, MoHFW, MoST through CSIR, and ICMR) to launch its clinical research studies related to SARS-CoV-2 and the COVID-19 disease. The



Withanone and CAPE are predicted to block the viral protein (M^{pro}) required for its replication. Withanone is also predicted to block cell membrane receptor required for entry of virus to the cells.

current research provides direct hint to its anti-viral activities when combined in appropriate proportions with New Zealand's Propolis.

The team has reported that natural compounds from Ashwagandha and Propolis have the potential to be effective anti-COVID-19 drug candidates. The team described that they have also searched for the capability to these bioactives to modulate the protein on the surface of human cells, to which the SARS-CoV-2 binds and allows its entry into our cell - the transmembrane protease serine 2 (TMPRSS2) and selected Withanone. The team said that their findings may not only connect to save time and cost required for screening for anti-COVID-19 drugs but may also offer some preventive and therapeutic value for the management of fatal COVID-19 pandemic and hence warrant prioritized validation in the laboratory and clinical tests. The study has given an opportunity to merge the traditional knowledge with the modern technologies.

Notably, DAILAB teams at IIT Delhi and AIST Japan have been working on natural compounds from Ashwagandha and Propolis for last several years.

Website link:
https://home.iitd.ac.in/news-covidaswagandha.php
https://www.india.gov.in/news_lists?a591236905

IIT Delhi start-up launches Reusable Antimicrobial Mask

An IIT Delhi start-up "Nanosafe Solutions" has launched an antimicrobial and washable facemask "NSafe", which is reusable up to 50 launderings, thus greatly cutting down the cost of use. The team consists of Dr. Anasuya Roy, an IIT Delhi Alumnus, Founder and CEO of Nanosafe Solutions Pvt. Ltd. and Prof. Mangala Joshi, Department of Textile and Fibre Engineering, IIT Delhi and also Founder and Director of the start-up.

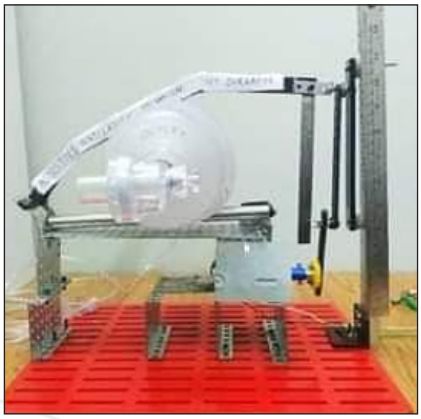
NSafe mask is a highly engineered triple-layered product consisting of inner hydrophilic layer for comfort, middle layer having antimicrobial activity and outer-most layer having water and oil repellent behaviour. The mask has 99.2% bacterial filtration efficiency (at 3 microns) and complies with ASTM standards of breathability and splash resistance. It is extremely comfortable and breathable. Elastic band in the chin region and wire in the nose region provides adequate fit of the mask to the wearer.

Prof. Mangala Joshi said, "We believe this is the first fabric-based antimicrobial facemask launched in India, which is washable and reusable along with very high Bacterial Filtration Efficiency as tested according to ASTM standards. It is engineered to have very good breathability and comfort." Dr. Anasuya Roy added, "The mask has been designed to maximize durability and dimensional stability, so that the mask can be reused 50 times. Effective reusability is an important factor as single-use masks will cause huge disposal issues."

NSafe mask enhances protection of the wearer through three different mechanisms: mechanical filtration, antimicrobial decontamination and repulsion of aerosol droplets. The masks are dry-cleaned before packaging and packaged under hygienic conditions. After each usage (approximately 8-9 hours), the mask has to be hand washed in cold water with mild detergent and dried thoroughly in the sunlight. After 50 usages, the mask has to be disposed in a sealed polyethylene bag and put in the recyclable waste bin. NSafe mask is a premium product that is likely to be available at MRP of Rs. 299 (Pack of 2) and Rs. 589 (Pack of 4). The start-up has started manufacturing the masks.

Website link:
https://nanosafesolutions.com/

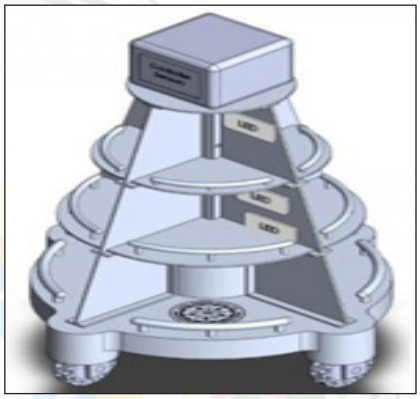
NIT Durgapur developed indigenous automated AMBU bag system



NIT Durgapur has developed an indigenous automated AMBU bag system that can serve as a quick and temporary substitute for ventilators in emergencies. AMBU stands for Artificial Manual Breathing Unit. The present system is automated and can be tuned for oxygen requirements. The system has been christened "Pranesh".

Website link:
https://nitdgp.ac.in/home

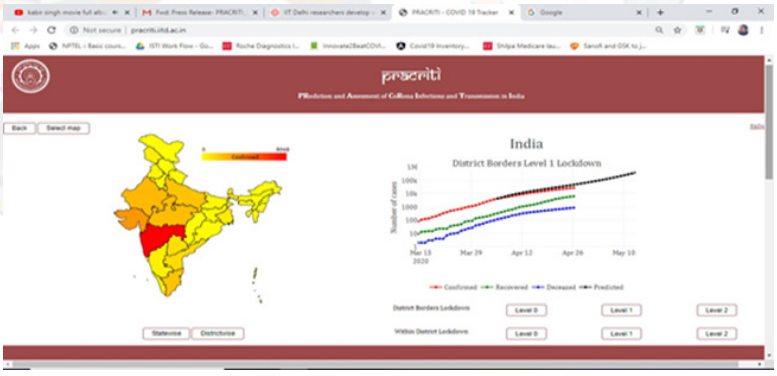
IIT Ropar researchers developed a concept 'WardBot' to support healthcare and different industries with a focus to minimise human interaction with COVID-19 patients



A team of researchers at IIT Ropar is aiming to develop a wardbot that will deliver food and medicine to COVID-19 patients in their isolation wards. The conceptual design is of a bot that can be instructed to receive and deliver food and medicines and the necessary equipment to every room from a remotely-located control room.

Website Link:
https://www.newindianexpress.com/good-news/2020/apr/17/iit-ropar-aims-to-build-ward-bot-that-can-serve-food-and-medicines-to-covid-19-patients-2131483.html

IIT Delhi researchers developed web-based COVID-19 dashboard 'PRACRITI'-Prediction and Assessment of CoRona Infections and Transmission in India



IIT Delhi researchers have developed a web-based dashboard for predicting the spread of COVID-19 in India. The mobile-friendly dashboard, named as PRACRITI (PRediction and Assessment of CoRona Infections and Transmission in India), gives detailed state-wise and district-wise predictions of COVID-19 cases in India. The projections are provided for a three-week period, which is updated weekly. The researchers believe that such a platform will be highly useful for healthcare bodies and local and central authorities to plan for different future scenarios and resource allocation efficiently.

Website link:
http://pracriti.iitd.ac.in/

NIT Srinagar developed RUHDAAR, a frugal ventilator for pandemics

Amid COVID-19 outbreak and presuming the shortage of ventilators, faculty members at the National Institute of Technology (NIT), Srinagar in collaboration with the faculty members, innovators and alumni at Design Innovation Centre (DIC), IUST developed a frugal ventilator prototype. The prototype named 'RUHDAAR' is essentially a low-cost mechanical ventilator which is targeted only for emergency situations or pandemics like COVID-19. The prototype was designed and fabricated at Design Innovation Centre, IUST.

Website Link:
https://nitsri.ac.in/uploaded_files/Report_Ruhdaar_Ventilator.pdf

SCIENCE OUTREACH & POPULARISATION EFFORTS

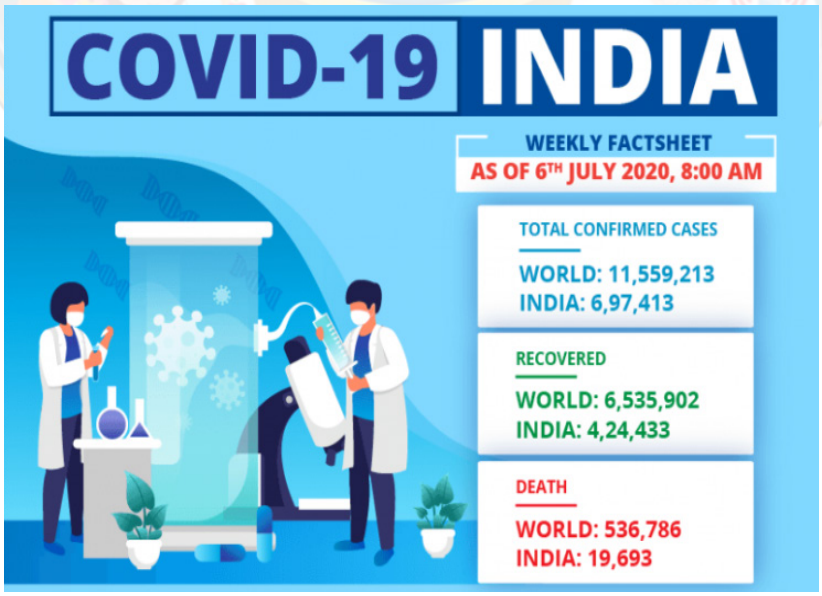
Since the outbreak of COVID-19 pandemic, the Ministry has supported numerous research projects and technology interventions through its various Departments, Autonomous Organisations, Professional Bodies, Statutory Bodies, and Laboratories. In the expedition of science outreach and popularisation, a number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

Efforts from Science Ministries, Departments & Scientific Organisations

Government of India presents regular COVID-19 India Factsheet

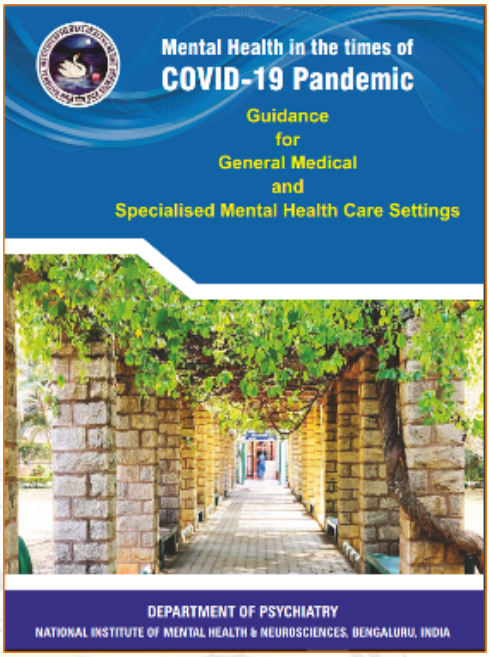
India's coronavirus cases are reaching 7-lakhs mark and now, as on 6th July 2020, 8:00 AM, stands at 6,97,413 cases out of which 4,24,433 have recovered. Government of India, through its Open Government Data (OGD) Platform https://data.gov.in/ has taken the initiative to present the regular factsheet related to COVID-19.

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-factsheet-as-on-06th-july-2020-800-am/

NIMHANS emphasises mental health in the times of COVID-19 pandemic

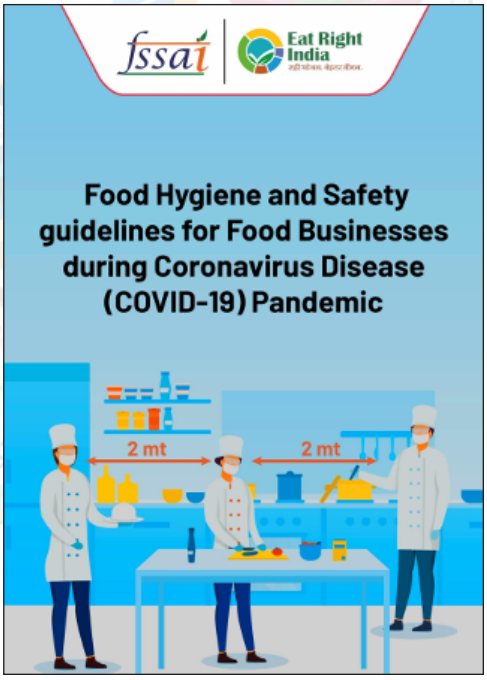


The Department of Psychiatry at National Institute of Mental Health & Neurosciences (NIMHANS) has collectively developed guideline for effective mental health management in general medical and specialized mental healthcare settings. This publication comprehensively covers mental health concerns of the general public as well as those with psychiatric illness. Beyond mental healthcare, it also addresses safety issues of psychiatrists and other mental healthcare providers. While being aware that mental health concerns may keep changing and different faces of the pandemic, this guideline will nevertheless continue to be relevant, though they may require modifications from time to time.

Contact Info: psychiatry@nimhans.ac.in

Website Link:
https://www.mohfw.gov.in/pdf/MentalHealthIssuesCOVID19NIMHANS.pdf

FSSAI issues food hygiene and safety guidelines for businesses during COVID-19 pandemic outbreak



Coronavirus Disease 2019 (COVID-19) caused by SARS-CoV-2 virus is the latest threat whose clinical and epidemiological characteristics are still being documented and has impacted the food industry adversely. The disease is spreading rapidly and the number of cases is rising in most of the countries and in India as well. The potential for food-borne transmission is a concern with every new emerging infection.

Food Safety and Standards Authority of India (FSSAI), the apex regulatory body for food safety in India, has issued the guidelines for business to achieve maximum food safety during this critical time. This document provides guidance to food businesses, including their personnel involved in handling of food and other employees to prevent spread of COVID-19 in the work environment and any incidental contamination of food/food packages.

Website Link:
https://fssai.gov.in/upload/uploadfiles/files/Guidance_Note_Food_Hygiene_Safety_07_06_2020_Revised_10_06_2020.pdf

AICTE announces Utkrishta Sansthan Vishwakarma Awards (USVA 2020) on the theme of INDIA FIGHTS CORONA

All India Council for Technical Education (AICTE), Ministry of Human Resource Development, Government of India, is holding a competition 'AICTE-Vishwakarma Awards-2020' for the students and institutes of AICTE approved institutions, under the theme of 'INDIA FIGHTS CORONA.' This awards aims to encourage and motivate young students and institutions to raise their performance in their specific domains leading to significant contribution towards the growth and development of the nation as a whole. The objective of the award is to recognize and honour the innovative work of the students displaying exceptional skills in different categories.

The portal for submitting the application is https://facilities.aicte-india.org/USVA/.

Website Link:
https://aicte-india.org/AICTE%20Vishwakarma%20Award%202020

Impactful S&T efforts initiated in last quarter

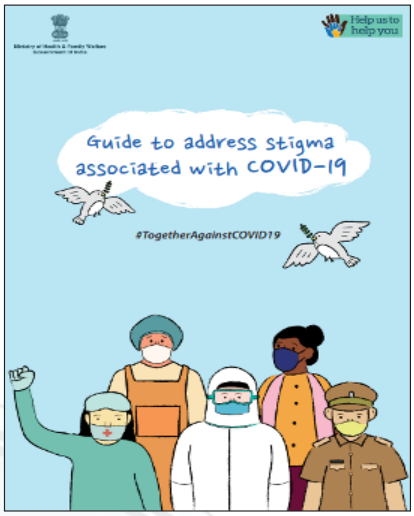
Government launched COVID INDIA SEVA to provide solutions to COVID-19-related queries

Union Minister of Health & Family Welfare, Science & Technology, and Earth Sciences, Dr Harsh Vardhan launched an interactive platform, COVID INDIA SEVA, on 21 April 2020. The initiative is aimed at providing real-time solutions to COVID-19-related queries. People can post their questions to the COVID INDIA SEVA twitter handle for getting swift replies from the team of trained experts. This initiative is aimed at enabling transparent e-governance delivery at large scale, especially in crises, like the ongoing outbreak of COVID-19 pandemic.

Dr Harsh Vardhan, in a tweet, said that through this platform, trained experts would be able to share authoritative public health information swiftly at scale, helping to build a direct channel for communication with citizens. Commenting on the launch of the social handle, he said that Twitter has proved to be an essential service for both the government and citizens to interact and exchange information, especially in times of need.

The responses by the experts will be available for everyone and users will not be required to share any personal details or health records on this account.

MoHFW releases a guide to address stigma associated with COVID-19



COVID-19 pandemic is a public health emergency that is causing a stressful and a difficult time for everyone. During this crisis, rumours and misinformation create more stress and can hamper COVID-19 recovery. To combat this misinformation, Ministry of Health and Family Welfare (MoHFW) issued a guide to address stigma associated with COVID-19. This guide for preventing and addressing social stigma associated with COVID-19 is intended to support governments, media and local organisations.

Website Link:
https://www.mohfw.gov.in/pdf/GuidetoaddressstigmaassociatedwithCOVID19.pdf

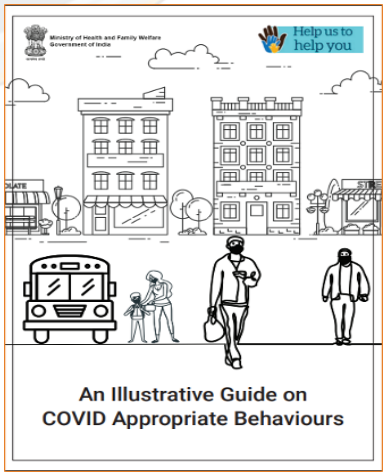
NCSTC comes up with an information brochure on health & risk communication scheme–Year of Awareness on Science & Health (YASH)

The National Council for Science & Technology Communication (NCSTC), Department of Science & Technology (DST) has released an information brochure for a recently launched programme on health and risk communication 'Year of Awareness on Science & Health (YASH) with focus on COVID-19'. The brochure carries information on the genesis and need of such a mega programme in the country to address the issues of risks, crises, disasters, and uncertainties especially posed by the COVID-19 pandemic. The programme focuses on enhancing public understanding and awareness on science and health for better preparedness to cope with the present and future challenges.

Contact Info: ncstc@nic.in

Website Link:
https://dst.gov.in/sites/default/files/YASH%20Brochure.pdf

An illustrative guide on COVID Appropriate Behaviours issued by MoHFW

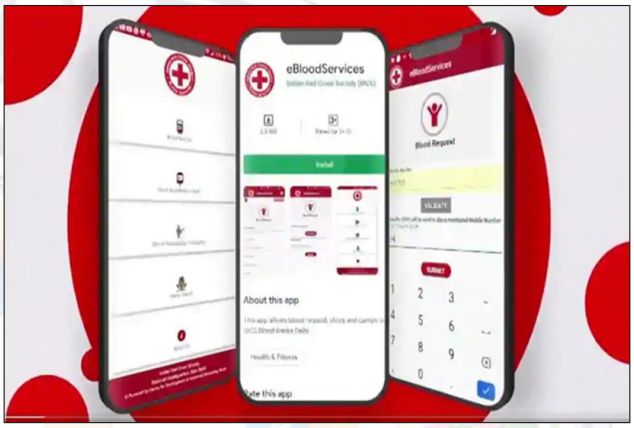


The COVID-19 pandemic has led to unprecedented and unanticipated challenges requiring collective action and support from all. While all necessary measures to fight the spread of Novel Coronavirus are being effectively led by the Government, there is a need to reinforce the importance of preventive measures and practices in a sustained manner to deal with the disease over the long run. To address the

challenge, Ministry of Health and Family Welfare (MoHFW) has released an illustrative guide on COVID-appropriate behaviours that are critical to winning this fight against COVID-19. This guidebook outlines a comprehensive list of 15 preventive behavioural practices which are critical to winning the fight against the deadly virus. This fight can be won only when everyone knows their roles and the goal.

Website Link:
https://www.mohfw.gov.in/pdf/IllustrativeguidelineupdateJ.pdf

Dr Harsh Vardhan launched Indian Red Cross Society's 'eBloodServices' Mobile App and congratulates for the initiative during COVID-19 crisis



Dr Harsh Vardhan, Union Minister of Health & Family Welfare launched the 'eBloodServices' Mobile App on 25th June 2020, developed by The Indian Red Cross Society (ICRS), through a video conferencing. The Union Health Minister is also the Chairman of Indian Red Cross Society.

This application is developed by the E-Raktkosh team of Centre for Development of Advanced Computing (CDAC) under the Digital India scheme launched by Prime Minister Shri Narendra Modi in 2015. Dr Harsh Vardhan said, "In keeping with the people-centred vision of the Hon. Prime Minister, Digital India has now become an integral part of every person's daily life. This Blood Donation App is a prime example of how the Digital India Scheme is serving the need for accessing blood services." He added that "Many people require blood-related services regularly because of certain medical conditions in their families. Through this App, four units of blood can be requisitioned at a time and the blood bank will wait for as long as 12 hours for the person to collect it. This App makes it easy for those in need to request for Blood units at IRCS NHQ." At a time when the country is facing such a pandemic, the Mobile App will provide succour to all those who direly require blood, he stated.

Once the request is placed through the App, the requisite units become visible to IRCS, NHQ blood bank in its E-Raktkosh dashboard and this allows assured delivery within the specified time. This feature will make it easy for a blood seeker to obtain blood and shall bring the added advantage of complete transparency and single-window access to the service.

Dr Harsh Vardhan praised all the voluntary blood donors who have donated blood during the ongoing COVID-19 outbreak. Red Cross has facilitated donation by voluntary blood donors by either providing transport or sending blood collection mobile vans for on-site blood donation. Urging people to become voluntary blood donors, Dr Harsh Vardhan stated that voluntary blood donation can be done by any person under the age of 65 years as many as four times in a year. "Regular blood donation can prevent obesity, cardiac problems and many other ailments. Not just this, blood donation is also a spiritual path by which mankind can be served," he added.

After the launch, Dr Harsh Vardhan presided over the Managing Body Meeting of the Indian Red Cross Society. Appreciating the efforts of IRCS, Dr Harsh Vardhan said, "IRCS has been

performing a major role during COVID-19 pandemic alongside the Government, especially in maintaining adequate supply of safe blood by issuing passes to blood donors, organizing blood donation camps." All 89 IRCS Blood Banks and 1100 branches across the country have collected more than a staggering 1,00,000 units of blood through in-house donations and from around 2000 blood donation camps organized during the lockdown period. Also, more than 38,000 voluntary blood donors registered with NHQ Blood Bank have been contacted and motivated to donate blood.

The NHQ Blood Bank conducted 55 blood donation camps collecting 2896 units of blood. A total of 5221 units were collected during the lockdown period. Blood has been issued to 7113 patients, including 2923 thalassaemic patients as well as to Government hospitals such as AIIMS Delhi (378 units) and Lady Hardinge (624 units). Also, IRCS has served more than 3,00,00,000 cooked meals and provided ration to more than 11,00,000 families.

Living with COVID-19: A Guide to New Normal

Nowadays, everywhere the only thing people are talking about is COVID-19 and numerous dos and don'ts that have brought life to a standstill, not just in the country but at a global level. In the wake of the COVID-19 outbreak, our lives have changed in ways we had never imagined before. The Union Ministry of Health and Family Welfare in India has indicated that Indians would have to learn to live with coronavirus, and there might be no early tapering off of the disease. This would require an adjustment to a new normal of several aspects of day-to-day life. Activities related to induce behavioural change regarding usage of masks at all public places will not only mean intensification of awareness drives but also access to key resources. To overcome the challenge, Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh and Panjab University (PU) have come up with an e-Book on the same topic. The book elaborates on various aspects of activities being touted as new normal, that is, living with COVID-19.

Contact Info: khaiwal.ravindra@pgimer.edu.in; sumanmor@pu.ac.in

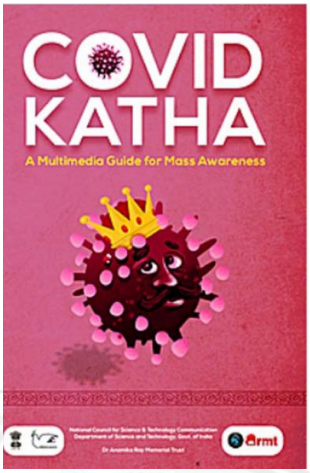
Website Link
https://www.care4cleanair.com/media
https://6c7e24ae-fb40-4331-a67d-c876b179abc8.filesusr.com/ugd/bce95d_a16e866f8a2741d2a32db8c0217366e1.pdf

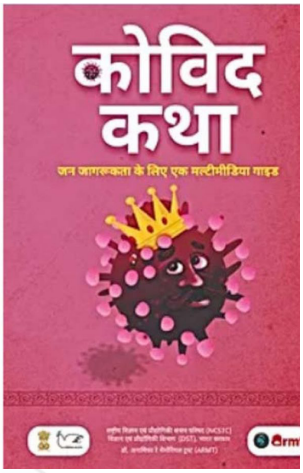
Department of Science & Technology reaches out to general public through COVID KATHA, a multimedia guide on COVID-19

Union Minister of Science & Technology, Health & Family Welfare and Earth Sciences, Dr Harsh Vardhan launched "COVID KATHA", a multimedia guide on COVID-19 on this occasion. As DST enters 50 years of serving the nation through Science & Technology, the Golden Jubilee Celebrations were also launched, initiating myriad activities in different parts of the country throughout the year.

Secretary (DST), Professor Ashutosh Sharma highlighted the major initiatives of DST, its vision for next five years and the steps DST is taking to identify and map technologies from R&D labs, academic institutions, start-ups, and MSMEs to fund nearly market-ready solutions for

diagnostics, testing, healthcare delivery, and equipment and supplies to combat COVID-19.





Senior scientists and officials from National Science & Technology Entrepreneurship Development Board (NSTEDB), Science for Equity, Empowerment & Development (SEED) and from Statutory Bodies like Science and Engineering Research Board (SERB), Technology Development Board (TDB) and the Survey of India (SoI) spoke about the different initiatives being taken to tackle the outbreak. Similarly, Directors of Autonomous Institutions like the Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram; International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad; Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) and Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru; National Innovation Foundation (NIF), Ahmedabad; and S. N. Bose National Centre for Basic Sciences (SNBNCBS), Kolkata spoke about the preparations they have made to brace for the crisis.

During the interaction, Dr Harsh Vardhan congratulated DST on the occasion of its 50thFoundation Day and said, "DST and its autonomous institutions have elevated Science & Technology in India to international levels and benefitted people across communities in myriad ways. DST provides the largest extramural research and development support in our country to strengthen national S&T capacity and capability through a competitive mode to scientists cutting across institutions and disciplines. DST's efforts have helped India attaining 3rd position globally after China and US in terms of number of publications in science citation index journals."

Praising the Indian scientists about their timely response in tackling COVID-19, he said, "Indian scientists have always risen to meet any challenge and this time also they have not disappointed the nation. We should remember that actions were needed with speed and scale at several fronts, which included: (i) Comprehensive mapping of our entire start-up ecosystem to identify and support relevant technology solutions ready for scale-up; (ii) Supporting industries and projects from academia and R&D labs working on modelling, properties of the virus and its impact, novel solutions, etc; and (iii) Activation of relevant DST's autonomous institutions in providing solutions. I am happy that our DST scientists achieved that despite the fact that we are running against time. Of particular mention here SCTIMST, Thiruvananthapuram which has already come up with over 10 effective products, several of which are of a breakthrough nature and are being commercialized rapidly."

Dr Harsh Vardhan said, "DST has contributed immensely to the S&T innovation space in our country over these 49 years. It has grown considerably with number of incubators and Start-ups increasing significantly." He highlighted some significant initiatives of DST and enumerated, "Schemes such as Augmenting Writing Skills through Articulating Research (AWSAR) launched to encourage young scientists to write popular science articles on their research pursuits; programme called National Initiative for Developing & Harnessing Innovations (NIDHI) to boost innovation and start-up activity, Million Minds Augmenting National Aspirations and Knowledge (MANAK) to encourage young students to think innovatively, a National Mission on Interdisciplinary Cyber-Physical Systems, new international S&T collaborations to connect

with the best global science projects abroad such as participation in Thirty Meter Telescope Project; and India-Israel Industrial R&D and Technological Innovation Fund of USD 40 million have uplifted India's science and technology efforts."

Making a special mention about the National Mission on Quantum Technology and Application (NM-QTA) announced by the Finance Minister during budget this year at a cost of Rs. 8,000 Crores, Union Science & Technology Minister said, "Launch of NM-QTA is a leap into the future to promote and foster R&D in Quantum Technologies and related areas like quantum computing, quantum cryptography, quantum communication, quantum metrology and sensing, quantum enhanced imaging etc. I am sure DST will make the country proud by bringing the fruits of this cutting-edge technology for the benefit of common people."

Concluding his remarks, Dr Harsh Vardhan said, "The National policy on Scientific Social Responsibility which is being worked out by DST should be an embodiment of the principles of responsible innovation and social entrepreneurship which DST has imbibed over its 49-year journey. I am sure the document will inspire all the grantees of projects to reach out to stakeholders of Science and Society at large with all the tools, knowledge, manpower and infrastructure of S&T in the academia and R&D labs by choosing of one or more activities: scientific infrastructure sharing; mentoring/training of college/university faculty; training on high end scientific skills and research; student internships; fostering research culture and many more."

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Website link:
https://dst.gov.in/news/covid-katha-multimedia-guide-mass-awareness
https://dst.gov.in/sites/default/files/COVID%20KATHA%20English.pdf
https://dst.gov.in/sites/default/files/COVID%20KATHA%20Hindi.pdf
https://dst.gov.in/dst-its-autonomous-institutions-elevated-science-and-technology-india-international-levels-dr-harsh

Special issue of monthly e-Newsletter 'STRIDES' on COVID-19

STRIDES (Science Technology Research Innovations and Developments) - A Department of Science & Technology (DST) Communication e-newsletter has been developed to bring news on S&T Development from DST support and beyond. It brings together articles, news stories, features, blogs and event reports. The Newsletter gives snapshot of the science & technology in India with focus on the activities, achievements & events of DST and its Autonomous and attached Institutions. The April 2020 edition of STRIDES focused on the pandemic – COVID-19. Through this effort, DST tried to bring to the table its efforts delegated towards research, technology and innovation that one would be interested to know and eventually update on the road to recovery and winning the combat.

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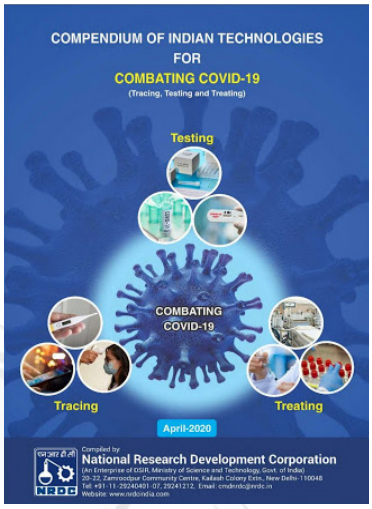
Website Link:
https://dst.gov.in/sites/default/files/Strides%20News%20Letter%207th%20Edition_0.pdf

NRDC brings out a Compendium of Indian Technologies for combating COVID-19



A "Compendium of Indian Technologies for Combating COVID-19 (Tracing, Testing and Treating)" prepared by National Research Development Corporation (NRDC) was launched by Dr Shekhar C Mande, Director General, CSIR and Secretary, DSIR, Government of India at CSIR Headquarters, New Delhi. The compendium carries information about 200 COVID-19-related Indian technologies, ongoing research activities, technologies available for commercialisation, initiatives and efforts taken by the Government of India, categorised under 3Ts of Tracking, Testing and Treating. Most of these technologies are proof-of-concept (POC) tested and can help the entrepreneurs to take the product to market faster as they do not have to reinvent the wheel. Dr Mande appreciated the initiative of NRDC for bringing out the Compendium of Indian Technologies for Combating COVID-19 by saying, "it is very timely and would benefit the MSMEs, Start-ups and the public at large."

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Website Link:
http://www.nrdcindia.com/uploads/press/1588779121Press_Information_Bureau.pdf
https://drive.google.com/file/d/1wTtuYtzGG5S3kKp1HgY6493pSh1oHHjM/view

Special issue of monthly e-Newsletter 'CSIR Samachar' on COVID-19

CSIR-Samachar is a monthly Newsletter published by CSIR-NISCAIR. The Newsletter consists of various contemporary activities. The April 2020 edition of CSIR Samachar focused on COVID-19 pandemic and efforts towards its mitigation.

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Website Link:
https://www.niscair.res.in/includes/images/csirsamachar/csir-samachar-april20.pdf

Special issue of monthly magazine SCIENCE REPORTER on COVID-19 by NISCAIR

Science Reporter is a monthly popular science magazine that has been published in India since 1964 by the National Institute of Science Communication and Information Resources (NISCAIR), New Delhi. It seeks to disseminate information about S&T developments throughout the world, with special focus on Indian scientific achievements. The magazine provides insight into all the major scientific and technological developments, presents facts about controversial scientific

concepts, and tries to bring to its readers interesting, exciting and informative information from various disciplines of science.

In this moment of a grave health crisis due to outburst of the novel coronavirus, Science Reporter has brought out a special issue on various aspects of mitigating the COVID-19 pandemic.

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Website link:
http://nopr.niscair.res.in/handle/123456789/54264

Onboarding of States/Union Territories' COVID-19 warriors to iGoT (Integrated Government Online Training) courses on DIKSHA Platform on COVID-19pandemic

Integrated Government Online Training (iGOT) has launched a programme to train all the COVID-19 warriors of India. The learning portal has national coverage, free access to all, 24 X 7 content availability from any location, any device and above all has relevant content developed by the Government of India which is updated regularly as the situation unfolds.

The iGOT COVID version is being hosted on Ministry of Human Resource Development's DIKSHA platform.

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Website Link:
https://www.mohfw.gov.in/pdf/OnboardingofStates.pdfhttps://igot.gov.in/igot/

Kids, Vaayu & Corona, PGIMER-Chandigarh and Panjab University produce an Educative Comic Series for COVID Awareness

COVID has become a nightmare for most of the people around the world. And while some of the adults are busy and could gather data from the common platforms like newspaper, for kids it really becomes incomprehensive to understand the talks, advisories and other scientific information. To overcome the challenge, Postgraduate Institute of Medical Education and Research (PGIMER, Chandigarh) and Panjab University (PU), have created an educative comic series titled 'Kids, Vaayu & Corona,' for children to make them aware about the threats of Coronavirus and ways to remain safe by taking simple precautionary steps for prevention and control of spread of the infection.

The Comic is based on dialogues between three kids and a superhero of the series, Vaayu - a global citizen who works for better public health and environment. The first part of the series explains simple terms like virus, the spread of virus, symptoms of the Coronavirus, steps for hand washing, importance of social distancing and other common dos and don'ts. The second part deals with more technical terms like quarantine, isolation, pandemic, lockdown, community

transmission, vaccine development, surgical masks, PPEs and helplines for contacting in case of emergencies. The comic also removes fear from the minds of little children by defining the mortality rate of the Coronavirus, etc.

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https://www.care4cleanair.com/media
https://www.mohfw.gov.in/pdf/Corona_comic_PGI.pdf
https://www.mohfw.gov.in/pdf/CoronaComic2PGIPU22Mar20.pdf

CSIR-NISCAIR brings out weekly e-Newsletter on COVID-19

National Institute of Science Communication and Information Resources (CSIR-NISCAIR) is bringing out a regular newsletter dedicated for the COVID-19 outbreak from May 2020. The newsletter covers stories and information on various aspects, like research, technology and innovation efforts to fight out the pandemic and related awareness and sensitisation information.

Website Link:
https://www.niscair.res.in/covidbulletin

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 occurrence 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.

Daily COVID video bulletin: Produced in both Hindi and English language, COVID 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.

COVID Explained - Short films to explain important research finding related to COVID-19 in layman's lingo. The subjects chosen for this short film caters to the curiosity of common man related to COVID-19 and

Facebook live sessions on interviews of various stakeholders and media with DST Secretary.

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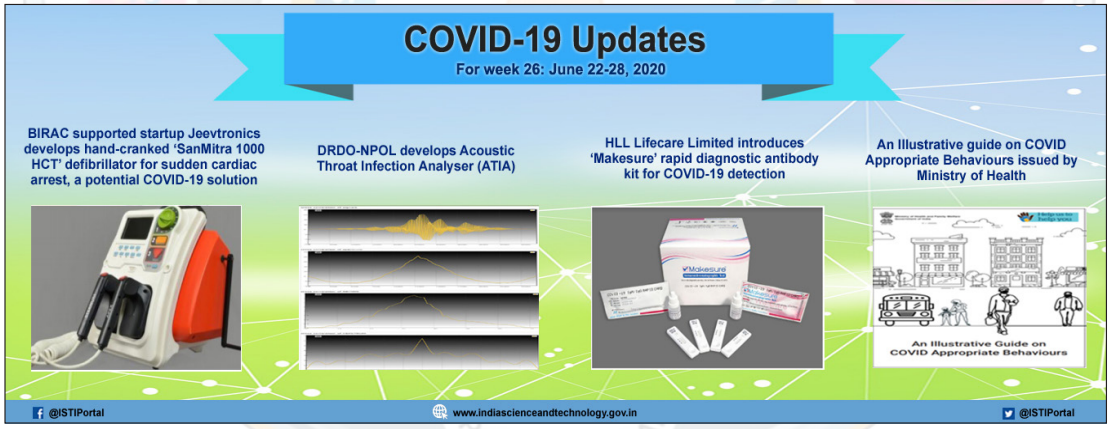
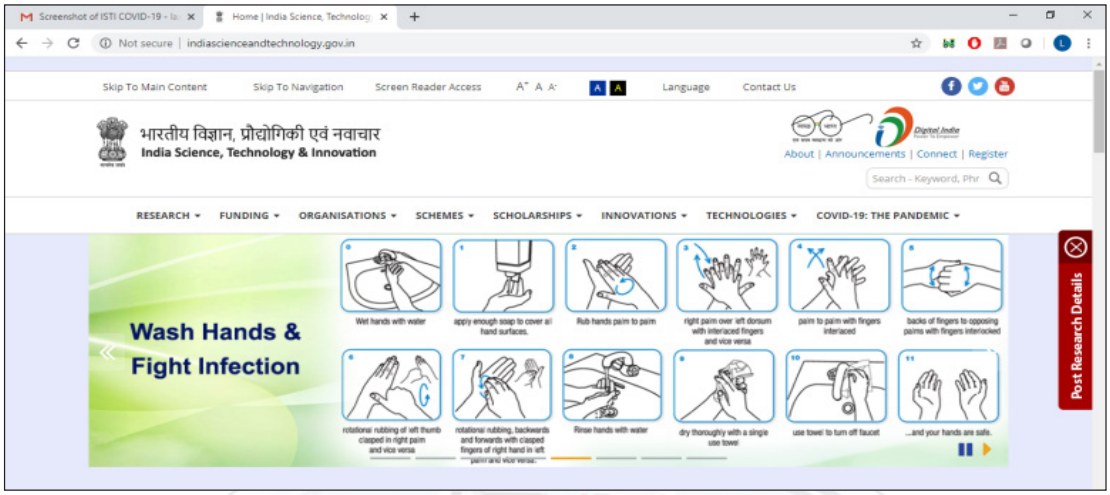
India Science, Technology and Innovation (ISTI) Web Portal

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 & 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 the 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 & prevention from spreading to the community. The reasons, usefulness and impact of social distancing have been communicated in an easy-to-understand manner.

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.

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

Special issue of monthly magazine 'DREAM 2047' on COVID-19

Vigyan Prasar brings out monthly bi-lingual science magazine Dream 2047. The magazine is being published by VP for last twenty-two years. Vigyan Prasar encourages reading the electronic version of this popular science magazine. The electronic version of the magazine is posted every month in Vigyan Prasar's website www.vigyanprasar.gov.in. All past issues of the magazine are available online.

The May 2020 edition of Dream 2047 focused on the pandemic COVID-19. VP has, through this effort, tried to bring to the table every possible aspect that one would be interested to know about the pandemic, cause and effects, and eventually update on the road to recovery efforts.

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Website link:
https://vigyanprasar.gov.in/wp-content/uploads/dream-may-2020-eng.pdf

Weekly Publication of e-Newsletter on COVID-19

For the benefit of its stakeholders and target audience, Vigyan Prasar is bringing out a weekly 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 on war footing to fight out the outburst of the pandemic. The e-Newsletter aims to be a handy guide to scientists, researchers and scholars, especially who are interested in knowing various aspects of COVID-19 and contributing to the coronavirus warfare in whatever minuscule way.

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Website link:
https://vigyanprasar.gov.in/covid19-newsletters/

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