



COVID-19

SCIENCE & TECHNOLOGY EFFORTS IN INDIA

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



सत्यमेव जयते
FOREWORD

डॉ हर्ष वर्धन Dr Harsh Vardhan

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

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

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

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

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

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

4. This document "Science & Technology Efforts on COVID-19 in India" shall serve as a ready-reckoner for policy makers, scientists, researchers, scholars and other stakeholders who might be interested in understanding and keeping themselves abreast with the latest S&T efforts being made to develop solutions to combat COVID19.


(Dr. Harsh Vardhan)

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PREFACE

At the fag end of 2019, China informed the World Health Organization (WHO) regarding the occurrence of cases of pneumonia of an unknown cause in Wuhan City in Hubei province. On January 9, 2020, WHO issued a statement saying Chinese researchers have made the preliminary determination of the virus as a novel coronavirus. Since then, several lakhs of positive cases and more than one lakh deaths have been reported due to COVID-19 across the world. Lockdowns, curfews, sealing of hotspots of outbreak area, massive airport screenings, quarantines, and social distancing have become the norm across the globe.

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 and journalistic flavour, ensuring that science and safety are the primary focus. VP is a national level organization of the Department of Science and Technology, Government of India, engaged in science communication and popularization. The principal objective of VP is to serve India's science popularization 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 popularization therefore serves as a robust knowledge-led tool to fulfil various mutually reinforcing public policy objectives.

For the benefit of the stakeholders, we have prepared a compilation of the most relevant initiatives and efforts taken by the Government of India through its various Science Ministries, Departments, and Funding organizations. These organizations 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 (Eols) to enhance research and development-related activities to battle the pandemic 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 in whatever minuscule way and people at large.

Vigyan Prasar
New Delhi

Digital Conference on **‘RE-START – Reboot the Economy through Science, Technology and Research Translations’, organised to celebrate the National Technology Day**

11th May 2020, New Delhi

The Union Minister of Science & Technology, Earth Sciences and Health & Family Welfare, Dr. Harsh Vardhan said on 11 May, 2020 that India’s fight against Covid-19 is moving fast ahead strongly and steadily. He was addressing a Digital Conference, RE-START – ‘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).



While applauding the Ministry of Science & Technology’s response to epidemics like COVID in the country, Dr. Harsh Vardhan emphasized that the S&T response reflects the collaborative spirit of the entire S&T ecosystem. “Indian Government, academia, scientists, start-ups, entrepreneurs and industry have been working relentlessly to find solutions to combat this pandemic. We must appreciate the efforts of our scientists, our entrepreneurs and our institutions working to find quick and deployable solutions for Covid-19. New discoveries, industry partnerships, and enhanced researches have thus been rapidly developed and adopted,” said the Minister.



“Within a short period of time, the nation has been able to mobilize a number of researchers to develop new testing kits, protective equipment, respiratory devices, etc.,” he added.

The minister also apprised the audience about the ‘COVID-19 Task Force’ set up by the Government to map the COVID-19-related technology capabilities. “Our Government has vigorously

supported the 'Make in India' Programme. This has brought in scientific institutions and start-ups to develop the Covid-19 tests, masks, sanitizers, personal protective equipment (PPEs) and ventilators," he further added.

On the theme for the National Technology Day this year, Dr. Harsh Vardhan pointed out, "We need to mitigate the widespread economic impact and prepare for a stronger recovery using self-reliance as the new mantra. Thus, we look towards new opportunities to galvanize growth in the technological and industrial sector."



While delivering his special address, Dr. V K Saraswat, Member, NITI Aayog, pointed out the importance of new-age technologies and medical and manufacturing technologies in boosting the economy as the world adjusts to the new normal.

Principal Scientific Advisor to the Government of India, Professor K. Vijay Raghavan, pointed out how technology can change the way we live our lives and the way we do things in future, particularly so in the post-COVID era. He pointed out that this is an opportunity to gear up for the future that lies ahead, and a better-equipped R&D workforce and ecosystem will prepare India better for future challenges.



DST has stepped into its 50th year of existence. DST Secretary Professor Ashutosh Sharma thus underlined the significance of the National Technology Day in view of the challenges faced during these times of COVID-19. He further emphasized that the COVID-19 crisis had led R&D and technology

development to work in various modes. The private-public model has encouraged R&D to greater heights. Plausible translations, prototyping, start-ups, and Industry have seen immense growth. According to him, rebooting the economy requires new age technologies, appropriate national missions, programmes and schemes to get into quick action. He added that wherever readymade solutions are not available, research and development needs to be more profound, relevant, speedy, impactful and strongly connected to industry. The lessons learnt now would continue to assist us in addressing the overarching challenges of the future—sustainable development, climate change, industry 4.0, anti-microbial resistance, etc.

Dr. Saumya Swaminathan, Chief Scientist, World Health Organization, highlighted the steps taken internationally to combat the pandemic and the way forward. Dr. Swaminathan appreciated the way India has tackled the COVID-1 challenge.



DG, CII, Mr. Chandrajit Banerjee; President, CII, Mr. Vikram Kirloskar; and Dr Neeraj Sharma, Secretary, TDB were also among those participating in the inaugural session.

In this occasion, Dr. Harsh Vardhan also inaugurated a virtual exposition of companies whose technologies have been supported by TDB. Various organizations and companies showcased their products in the exposition through a digital B2B lounge.

The conference has hence brought together Scientists, Technocrats, Government officials, Diplomats, WHO officials and dignitaries from national and international Industry, Research Institutions and Academic Institutions on a single platform to share their insights on the role played by S&T in the global healthcare crisis and to find solutions to address the current challenge.

The Conference also had technical sessions on 'Medicines & Medical Technologies'; 'Advanced Materials – New Technology Horizons'; 'Advanced Manufacturing Technologies for Sustainable Future & Global Innovation' and 'Technology Alliance for Global Economic Leadership'.

Website link:

<https://dst.gov.in/india-well-poised-reboot-economy-through-st-dr-harsh-varadhan>

DR. HARSH VARDHAN LAUNCHES 'AYUSH SANJIVANI' APP AND INTER-DISCIPLINARY STUDIES INVOLVING AYUSH INTERVENTIONS FOR COVID-19

7th May 2020, New Delhi

“The alliance between technology stakeholders will help the traditional knowledge of AYUSH to reach a large global population.”

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

The graphic is a promotional poster for the 'AYUSH Sanjivani' app. At the top left is the logo of the Ministry of AYUSH, and at the top right is the 'myGov' logo. The central text reads: 'Expanding Horizons of Age-Old Traditional Knowledge of Ayurveda with AYUSH Sanjivani App'. Below this, there are four icons with corresponding text: 1. A green hexagon with a virus icon: 'To generate data on acceptance & usage of AYUSH measures & its impact on prevention of COVID-19'. 2. A blue hexagon with a person icon: 'Provide AYUSH advisories related to immunity boosting measures'. 3. A red hexagon with a person icon: 'Promote AYUSH knowledge for larger good of the global community'. 4. A purple hexagon with a person icon: 'To develop AYUSH interventions & solutions; to reach out to target of 50 lakh people'. In the center is a smartphone displaying the app's logo. At the bottom, there are images of herbs and a 'Download Now!' button with the Google Play logo. The date 'Dated: 9 May, 2020' is at the bottom right.

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.

DST & ITS AUTONOMOUS INSTITUTIONS ELEVATED SCIENCE AND TECHNOLOGY IN INDIA TO INTERNATIONAL LEVELS

— DR. HARSH VARDHAN

3rd May 2020, New Delhi

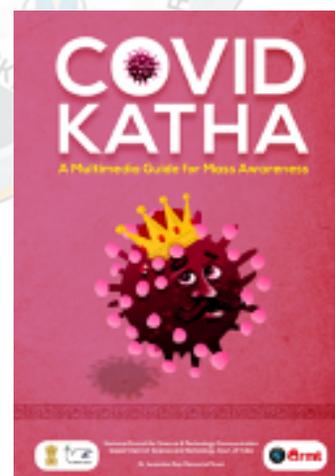
Union Minister of Science & Technology, Health & Family Welfare and Earth Sciences, Dr. Harsh Vardhan today interacted with Heads of all Autonomous Institutions (AIs) and Subordinate offices of Department of Science & Technology (DST) via Video Conferencing on the occasion of 49th DST Foundation Day (3rd May, 2020) about their S&T initiatives, particularly in relation to their endeavours for combating the COVID-19 outbreak.



The Minister also 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 50th Foundation 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 scaleup; (ii) Supporting industries and projects from academia and R&D labs working on modelling, properties of the virus and its impact, novel solutions, etc; (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.”

Website link:

<https://dst.gov.in/dst-its-autonomous-institutions-elevated-science-and-technology-india-international-levels-dr-harsh>

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

— DR. HARSH VARDHAN

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

- Dr. Harsh Vardhan

28th April 2020, New Delhi

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 BIBCOLD 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, 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 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 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.

DR. HARSH VARDHAN EXHORTS CSIR SCIENTISTS TO DEVELOP COVID-19 MITIGATION SOLUTIONS TO EFFECTIVELY COMBAT THE DISEASE

12th April 2020, New Delhi

- Genetic sequencing was crucial in eradicating Polio; it will help in COVID-19 mitigation also, said Dr. Harsh Vardhan
- These are times of war, deliver solutions before war ends, not a routine research project, states Dr. Harsh Vardhan
- COVID-19 will give boost to country's resilience and self-reliance and enhance indigenous capacity in developing critical healthcare equipment

Today Dr. Harsh Vardhan, Union Minister for Science & Technology held a review 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 Corona Virus outbreak in the country.

DG CSIR Dr. Shekhar C. 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



Dr Harsh Vardhan during video conferencing on research and developments initiatives on Covid-19 with the directors of CSIR labs

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.

After briefing of all the efforts being made by the CSIR labs in finding a solution for COVID-19, Dr. Harsh Vardhan informed them about the steps being taken by the Government of India in combating COVID-19.

Dr. Harsh Vardhan exhorted CSIR scientists and said, "India has high expectations from its scientific community and I am sure that the community will rise to the occasion and deliver in this time of need". He appreciated that CSIR Labs were also participating in testing of swab samples of COVID patients and some of them have started doing genetic sequencing of the virus with a target of doing 500 sequencing in coming weeks. Dr. Harsh Vardhan said, "Genetic sequencing is very crucial in identifying the host response as well as identifying population vulnerability to the disease." He 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."

He also appreciated CSIR for partnering with MSMEs, Major industries, PSUs working on RT-PCR machines. He said, "Plasma-based therapy is very much needed at this hour. For this, we need to motivate the patients who have recovered from the COVID-19 to donate blood."

He also appreciated the work done by CSIR-NAL with BHEL and BEL on Ventilators, Oxygen Enrichment Devices and 3-D printed face shields, face masks, gowns and other protective equipment. "All these things will help us in next few weeks," he said.

Dr. Harsh Vardhan, however, cautioned CSIR scientists to develop COVID-19 mitigation solutions keeping fixed timeframe in mind. "These are times of war, CSIR scientists should work to deliver solutions before war ends, they should not treat it as a routine research project". He said, "COVID-19 has also come as a blessing in disguise as it will give boost to country's resilience and self-reliance and enhance indigenous capacity in developing critical healthcare equipment." He also appreciated the collaboration being done by the CSIR scientists using Video Conferencing tools and reiterated the scientists that while doing research they should continue observing social distancing and lockdown because till such time vaccine is developed by scientists to combat COVID-19, these two remain the most potent form of social vaccine.

Dr. Shekhar C. Mande, DG, CSIR, Dr. Anurag Agrawal, Director, Institute of Genomics and Integrative Biology (CSIR-IGIB) and Dr. Nakul Parashar, Director, Vigyan Prasar were present in the review meeting with the Union Minister. Directors of remaining 38 CSIR labs attended the meeting through Video Conference.

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.



Website link:

<https://twitter.com/drharshvardhan/status/1252529868899708930?s=20>

<http://newsonair.com/Main-News-Details.aspx?id=386270>

<https://www.businesstoday.in/latest/trends/what-is-covid-india-seva-an-explainer/story/401619.html>

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

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

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SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

DEPARTMENT OF SCIENCE AND TECHNOLOGY (DST)

Knowledge Organizations focus on initiatives for socioeconomic rejuvenation and resilience using S&T during COVID-19 pandemic

Knowledge Organizations across the country have started creating scientific awareness on COVID-19 using social, print and electronic media and have also started initiatives for building resilience at community level during and post-lockdown period in response to the advisory issued by the DST as part of their Scientific Social Responsibility (SSR).

DST-funded labs CSIR-NBRI; ICAR Labs; Chandigarh University; Manipur University; Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir (SKAUST), Srinagar; and Baba Farid University of Health Sciences, Faridkot, Punjab contributed their knowledge and resources for the development and distribution of sanitizer as per World Health Organization (WHO) guidelines, mask preparation as per the guidelines issued by Principal Scientific Advisor (PSA) and services for COVID-19 testing.

A mobile App-based regular advisory to pregnant women has been initiated under already ongoing projects at AIIMS New Delhi. SKAUST, Srinagar initiated a telemedicine facility for monitoring the health of farm animals under ongoing projects. In order to address breathing-related issues, a herbal decongestion spray on the principles of Ayurveda has been developed. More than 5000 L of sanitizer has been distributed among migrant population at AIIMS-New Delhi; Safdurjung Hospital, New Delhi; and Police Department of Haryana, Punjab, and UP and the process is continuing towards the containment of disease. The technology of herbal sanitizer developed under the DST-funded ongoing project has been transferred to companies for bulk production and sustaining the supply for public consumptions at an affordable rate. The protocol has been shared with Voluntary Organizations for distribution at the local level.

Website link:

<https://dst.gov.in/knowledge-organizations-focus-initiatives-socioeconomic-rejuvenation-and-resilience-using-st-during>

DST supports assistive tools, technologies and techniques to combat challenges faced by Divyangjan & elderly during COVID-19

The DST has taken several initiatives to mitigate the impact of COVID-19 among Divyangjan and elderly and identified various challenges faced by them for finding technological solutions.

The organizations supported by Science for Equity Empowerment and Development (SEED) Division of DST have been instrumental in developing various assistive tools, technologies

and techniques, that are affordable and adaptable to the Indian milieu through its programme on Technology Interventions for Disabled and Elderly (TIDE), for creating inclusiveness and universal accessibility for Divyangjan and elderly.

Under this programme an e-Tool to create awareness and impart health and hygiene-related information along with education and entertainment to overcome loneliness of the persons with intellectual disabilities due to COVID-19 pandemic has been developed by Rajalakshmi Engineering College, Chennai. This will help the persons with intellectual disability to learn with fun through Tabs and mobiles. The e-Tool can also be converted to other vernacular languages and the Beta Version of the e-tool is used by 200 specially-abled children.

Website link:

<https://dst.gov.in/dst-supports-assistive-tools-technologies-and-techniques-combat-challenges-faced-divyangjan-elderly>

S&T-based innovative solutions by common people participating in NIF's Challenge COVID-19 Competition (C3) ready to make a difference

The National Innovation Foundation–India (NIF), an autonomous body of the DST has identified several S&T-based innovative solutions through the Challenge COVID-19 Competition (C3), a campaign which was running from 31st March to 10th May 2020 for engaging innovative citizens to come up with ideas and innovations to tackle the pandemic.

NIF is providing incubation and mentoring support for further dissemination to the generator of the ideas. A foot-operated device for hand sanitization and washing and an innovative sprayer for sanitization are the two recently supported innovations under the campaign.

Shri Mupparapu Raju from Warrangal, Telangana has designed the foot-operated device for hand sanitization and washing, which is a timely solution in response to need for contactless devices in the prevailing COVID-19 environment. It facilitates dispensing of soap and water by way of operating the device by foot and not hands. As a result, there is no hand-related contact between the user and sanitizer, soap, or water, which are adequately stored in separate containers as a part of the device. Shri Raju has implemented the device at various locations (Warrangal, Mahabubabad, and others) in the State of Telangana. NIF has extended support to the innovator for value addition and in meeting the production commitments.

Website link:

<https://dst.gov.in/st-based-innovative-solutions-common-people-participating-nifs-challenge-covid-19-competition-c3>

TDB approves technologies to augment India's efforts to combat COVID-19

Technology Development Board (TDB), a statutory body of the DST, is proactively supporting the efforts of the scientists, technologists, entrepreneurs, and industrialists towards preventing and containing the spread of the COVID-19 pandemic by providing financial support for commercialization of these technologies. In addition, TDB is also scouting for novel solutions for supporting the country's efforts in tackling the healthcare emergency that the world is facing.

In the last few weeks, TDB, through its evaluation process, has processed a large number of applications under various domains. Till date, it has approved six projects towards commercialization, which include thermal scanners, medical devices, masks, and diagnostic kits.

Website link:

<https://dst.gov.in/tdb-approves-technologies-augment-indias-efforts-combat-covid-19>

JNCASR develops Predictive Model for COVID-19 District-Wise Projections for each state in India

Researchers at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) and Indian Institute of Science (IISc) have developed a predictive model for spread of the novel coronaviruses, SARS-COV-2. The model gives a state-wise projection for the following few weeks. The Model developed by Prof. Santosh Ansumali from JNCASR and Prof Alope Kumar from IISc offers a state-wise analysis, throwing up several features of the pandemic wave in India. To facilitate the same, a virtual war room has been set up at JNCASR, wherein the data from various sources like hospitals, community health centre etc., are being collected, analysed, mapped and the resultant output is being shared with the Office of the Principal Scientific Adviser.



Website link:

<https://mesoscalelab.github.io/covid19/district.html>

<http://www.jncasr.ac.in/covid/index.html>

Training course on Laboratory Diagnosis of COVID-19

COVID-19 is an infectious disease caused by the SARS-CoV-2 virus that leads to severe respiratory illness. While the demand for testing is very high, there is a severe shortage of trained persons to carry out these specialized tests. To help build capacity for the national fight against COVID-19, the COVID Diagnostic Training Centre is being established at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institute of the DST.

The Centre is offering comprehensive training in molecular clinical diagnostics effective immediately. The six-week residential Training Course is designed to impart theoretical knowledge and hands-on expertise in required molecular biology techniques and BSL-2 workflow. The training does not require handling of live SARS-CoV-2 virus. Skills mastered during the course will make trainees adapt at performing immune and molecular diagnostic assays in a clinical set up.

Website link:

<http://www.jncasr.ac.in/covid/index.html>



Call for Proposals under National Health and Risk Communication Programme ‘Year of Awareness on Science and Health (YASH)’ for COVID-19

National Council for Science & Technology Communication (NCSTC), DST launches a programme on health and risk communication “Year of Awareness on Science & Health (YASH)” with focus on COVID-19.

Special call for proposals has been announced for science, health and risk communication with focus on COVID-19 - building improved risk understanding, an analytical mind, and informed decision-making capacity among target groups including working with local sensitivities, belief systems, traditions, and indigenous knowledge; translation, target group-specific interpretations and usage of authentic scientific and health information to communicate the risks and facilitate risk management; attitudinal changes about appreciating risks, associated challenges and solutions and assessment of public perceptions; improved ability to clarify mis-perceptions, mis-beliefs, mal-practices-based authentic knowledge duly verified by scientific processes; trust in scientific competence of solutions and service providers and better working relations with community leaders, influencers including faith leaders, doctors, etc.; science literacy for risk reduction; development of science, health, and risk communication software in terms of publications, audio-visual, digital platforms, low-cost learning aids, folk performances, trained communicators, especially in regional languages; campaigns, hands-on science, demo/exhibitions/fairs, mela, jatha, competitions, children centric outreach, etc.

Last date for submission of Proposal: 31st May 2020

Website link:

<https://dst.gov.in/callforproposals/call-proposals-under-national-health-and-risk-communication-programme-year>

<https://dst.gov.in/sites/default/files/YASH%20Backgrounder.pdf>

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

DEPARTMENT OF BIOTECHNOLOGY (DBT)

Convalescent Plasma: Potential therapy for COVID-19

Research on convalescent plasma therapy for COVID-19 is set to get a boost with the Department of Biotechnology (DBT) and its public sector enterprise Biotechnology Research Industry Research Council (BIRAC) clearing a proposal from Virchow Biotech Pvt Ltd for support to work on the therapy under DBT's National Biopharma Mission.

DBT and BIRAC had recently 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. The first phase of the call closed on 30th March 2020; the review is ongoing. Virchow Biotech had submitted the proposal under the call.

Hyderabad-based Virchow Biotech has been commercially manufacturing intravenous immunoglobulin (IVIG) from human plasma since 2013 in a WHO-approved and dedicated plasma fractionation cGMP facility. Currently, they have the capacity to process over 300,000 litres of plasma annually. They are one of the largest manufacturers of human IVIG and human serum albumin in India.

They are also the first company in India to identify Immunoglobulin Therapy, which can prove to be more promising as compared to direct plasma administration. Direct plasma therapy has several safety, efficacy and specificity concerns. Single transfusion might not be sufficient and transfer of other blood components

may pose inadvertent risks. The sterility and specificity of intravenous immunoglobulins will help to prevent these risks and keep track of administered dosage.

The proposed immunotherapy procedure already has got necessary approvals in place from Drug Controller General of India; Central Drugs Standards Control Organization and funding from BIRAC. The company plans to start its clinical trials for the same very soon.

The company has proposed to collect plasma from several human convalescent donors, in order to prepare standardized immunoglobulin enriched for anti-COVID antibodies with a



specific titer. Immunoglobulin treatment is increasingly recognized to treat a variety of diseases not just because of its ability to fight the infection but also due to its immunomodulatory and immunosuppressive activities. In the absence of other proventherapies, it is expected that these immunoglobulins will prove crucial in reducing themorbidity from the COVID-19 infection potentially saving valuable human lives.

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-02S-12MAY2020.pdf
https://birac.nic.in/webcontent/1584538942_COVID_19_Research_Consortium.pdf

COVID testing facility at DBT-CDFD, Hyderabad

A short video on the effort is being made by the DBT's Hyderabad-based Centre for DNA Fingerprinting and Diagnostics (DBT-CDFD) towards fighting the COVID-19 pandemic in the form of a COVID testing facility, where a team of dedicated volunteers are involved in testing sample round the clock.



Contact details: Varsha, Staff Scientist & Head-Science Communication (E-mail: scom@cdfd.org.in)

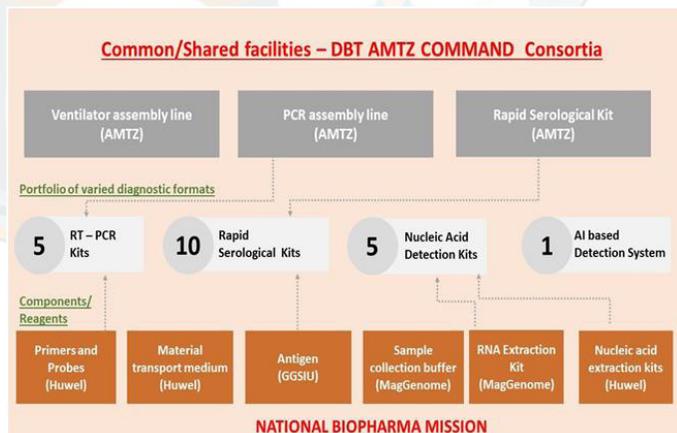
Website link:

https://drive.google.com/file/d/10dlYFDEsIn-8vGB2-7XFXo8smee8_KLxI/view?ts=5ead8810
https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt-01S-13MAY2020.pdf

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 is 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.HafsaAhmad (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

DBT-NCCS partners with IIT-Indore, Bharat Biotech, PredOmix and AFMC in a joint initiative against COVID-19

Scientists at DBT's autonomous institution, the National Centre for Cell Science (NCCS), Pune, will work towards generating high-affinity human antibodies against SARS-CoV-2. They will work in association with partners from the Indian Institute of Technology (IIT), Indore, PredOmix Technologies Private Limited, Bharat Biotech International Limited, and the Armed Forces Medical College, Pune. The team aims to jointly explore strategies to produce the antibodies initially on a small scale in the research laboratories, for subsequent manufacture on a larger scale by the industry partners. This joint initiative is funded by the New



NCCS will work with CSIR's approved project to develop human monoclonal antibodies that can neutralize COVID-19 in patients| Photo Credit:TimesNews.Com

Millennium Indian Technology Leadership Initiative (NMITLI), a flagship programme of the Council for Scientific and Industrial Research (CSIR). This partnership aims to help tackle the current pandemic more efficiently by leveraging the complementary expertise of academia and industry as well as clinicians involved in frontline response to COVID-19.

There is an urgent and huge unmet need for novel therapeutic interventions to tackle the COVID-19 pandemic, given that no specific antiviral drugs or vaccines are available at present. Generally, the body's immune system helps fight diseases by producing proteins called antibodies. These antibodies can neutralize viruses by binding to them and preventing them from entering into the host's cells, which is necessary for the virus to survive and multiply. Antibodies thus block the spread of the virus and make them ineffective.

Strategies like vaccination protect us from disease by inducing our immune system to produce antibodies against specific viruses before somebody is exposed to the disease-causing virus. However, the development of a vaccine takes time and also relies on the ability of the individual to produce an immune response. The latter might present challenges in certain populations that often show an inadequate immune response, such as the elderly and individuals with underlying health problems such as diabetes, in which COVID-19 can be more fatal. Furthermore, while vaccines work well for preventing infections, they provide little benefit once the infection is established. Therefore, alternative strategies are also necessary; especially to meet the immediate need to control COVID-19.

The passive transfer of highly-specific neutralizing antibodies against SARS-CoV2 could serve as a valuable option for the prevention and treatment of COVID-19. Therefore, the use of convalescent plasma, the antibody-rich component obtained from the blood of individuals who have recovered from COVID-19, is being much talked about as a possible intervention. However, meeting the high demand for convalescent plasma merely from blood donors who have recovered from the disease poses obvious challenges.

Website link:

https://twitter.com/DBT_NCCS_Pune/status/1259354984262631424

<https://www.timesnownews.com/health/article/csir-approves-project-to-develop-human-monoclonal-antibodies-that-can-neutralize-covid-19-in-patients/589399>

<https://english.lokmat.com/national/csir-sanctions-project-to-develop-human-monoclonal-antibodies-as-therapy-for-covid-19/>

https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt-01B-14MAY2020.pdf

DBT-THSTI announces video making competition for COVID-19 awareness

With the intention of tapping immense creative potential available in the country and moving ahead with the science education mandate of DBT's Translational Health Science and Technology Institute's Science Setu initiative, the institute has invited college-goers from across the country to participate in the THSTI Video Competition 2020. The three themes the participants will be needed to create content are:



THSTI VIDEO COMPETITION 2020

Calling all video-making enthusiasts with a thing for science communication to create short videos and explain COVID-19.

You can register if:

1. You study at an Undergraduate college in India
2. You wish to communicate the science underlying COVID-19 and SARS-CoV-2 and tell stories about Corona Warriors.

Things to remember:

1. The video should be less than 3 minutes.
2. Make a high-resolution video. Send it to socialmedia@thsti.res.in.
3. The video can be made in any Indian language.
4. Top three videos will be awarded.
5. For more details and registration click on: <https://thsti.in/covid>

LAST DATE FOR SENDING THE VIDEOS - 10th JUNE 2020

Picture: www.worldarts.net

- The science behind COVID-19 and SARS-CoV-2;
- COVID-19 heroes; and
- The Infodemic in the Pandemic

This competition is open to participants from any college in India and they can register through this link: <https://thsti.in/covid/index.php/Home/media>. The videos need to be within 3 minutes and there is no language restriction. The last date for sending entries is 10th June 2020.

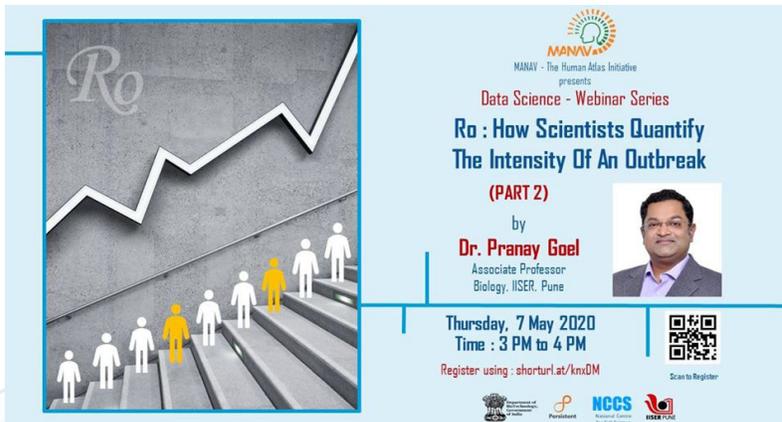
Website link:

<https://thsti.in/covid/index.php/Home/media>

https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt-02B-14MAY2020.pdf

Learn how scientists quantify the intensity of an outbreak

At present, the media have been flooded with a plethora of information related to COVID-19, SARS-CoV-2, and various aspects of pandemics in general. Consequently, people are often introduced to unfamiliar concepts and terminologies that are relevant to the current situation, such



as “flattening the curve” and “R0” (R naught). To help people learn more about some of these concepts and how data scientists approach pandemics, a webinar series on Data Science was organized by “Manav - The Human Atlas Initiative”, a collaborative project between DBT’s National Centre for Cell Science (DBT-NCCS), IISER-Pune and Persistent Systems on 7th May 2020.

The series was kick started with a webinar on “R0: How scientists quantify the intensity of an outbreak”. The first of a two-part webinar on this topic was presented by Dr PranayGoel, Associate Professor at IISER-Pune, on 30th April 2020. The second part of this webinar was held on 7th May, 2020, at 3:00pm. The webinar was open to all and free and interested science enthusiasts were invited to participate. The first part was attended by many students, whose enthusiastic participation in a Q&A session after the webinar is a testimony to the success of the webinar. The second session was also meant to be interactive, to enable the participants to engage in a fruitful dialogue with the speaker. The “Manav” initiative is funded by the DBT and co-funded by Persistent Systems.

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

Website link:

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

<https://twitter.com/ManavAtlas/status/1256182915697971200>

https://www.facebook.com/permalink.php?story_fbid=3038052766253861&id=509782325747597¬if_id=1588507593375051¬if_t=page_post_reaction

IBSD augments Covid-19 testing capacity of RIMS by sharing kits and instrumentation

In order to increase testing capacity at Virus Research and Diagnostic Laboratory of Regional Institute of Medical Sciences (RIMS), Imphal, the Institute of Bioresources and Sustainable Development (IBSD) handed over one RNA extractor kit and one Real-Time-PCR (polymerase chain reaction) instrument to the Medical Superintendent, DrChArunkumar. The instrument was given to supplement the existing functioning and detection of the COVID-19 cases.

Real-time-PCR is one of the most accurate laboratory methods for detecting, tracking, and studying the coronavirus. Each COVID-19 test requires one RNA extraction kit needed for RT-PCR test. According to a press release, Director IBDS, Prof Pulk K Mukherjee congratulated and encouraged the whole team of the RIMS who are doing yeoman’s service in the tough time of fighting the pandemic. IBSD team is also ready to extend any possible help with the

available resources at the institute for fighting the COVID-19. Earlier, IBSD Imphal has also provided a Real-Time PCR instrument along with other consumables to JNIMS to supplement their existing functioning and detection of COVID-19 cases.



IBSD hands over kits, instrument to RIMS (Image source: Northeast Now)

Contact info: Prof. Pulok Kumar Mukherjee, Director, Institute of Bioresources and Sustainable Development (IBSD), Imphal. Email: director.ibsd@nic.in

Website link:

http://e-pao.net/epSubPageExtractor.asp?src=news_section.Press_Release.Press_Release_2020.Handing_testing_equipments_for_COVID_19_to_RIMS_20200502

<https://nenow.in/north-east-news/manipur/covid-19-ibsd-hands-over-kits-instrument-to-rims-in-manipur.html>

<https://www.easternmirrornagaland.com/rna-extractor-kit-and-real-time-pcr-to-help-rims-fight-covid-19/>

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

Structural and functional implications of non-synonymous mutations in the spike protein of 2,954 SARS-CoV-2 genomes

A team of Scientists at Corona Research & Intervention Group at DBT's Rajiv Gandhi Centre for Biotechnology (RGCBC), Thiruvananthapuram have studied structural and functional implications of non-synonymous mutations in the spike protein of 2,954 SARS-CoV-2 genomes. Since the SARS-CoV-2, the causative agent of COVID-2019 pandemic, is an RNA virus prone to mutations, the information on mutations within the circulating strains of the virus is pivotal to understanding the disease spread and dynamics.

Dr. Shijulal and team at RGCBC have analysed the mutations associated with 2,954 globally reported high quality genomes of SARS-CoV-2 with special emphasis on genomes of viral strains from India. Molecular phylogenetic analysis suggests that SARS-CoV-2 strains circulating in India form five distinct phyletic clades designated R1-R5. These clades categorize into the previously reported S, G as well as a new unclassified subtype. A detailed analysis of gene encoding of the Spike (S) protein in the strains across the globe shows non-synonymous



mutations on 54 amino acid residues. Among these, the research team pinpointed 4 novel mutations in the region that interact with human ACE2 receptor (RBD).

Further *in silico* molecular docking analyses suggested that these RBD mutations could alter the binding affinity of S-protein with ACE2 that may lead to changes in SARS-CoV-2 infectivity. Strikingly, one of these RBD mutations (S438F) was found unique to a subset within the R4 clade suggesting intrinsic S-protein variations in strains currently circulating in India. The research team's findings revealed a unique pattern of SARS-CoV-2 evolution that may alert vaccine and therapeutic development.

Contact info: Dr. Shijulal Nelson-Sathi & Dr. Umasankar P.K. Email: shijulalns@rgcb.res.in, umasankarpk@rgcb.res.in

Website link:

<https://www.biorxiv.org/content/10.1101/2020.05.02.071811v1>

https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt-02B-12MAY2020.pdf

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH (CSIR)

CSIR collaborates with Intel and IIIT-Hyderabad to combat COVID-19

Faster testing and predicting rapidly the patients at risk is crucial to mitigate SARS-CoV-2 transmission. CSIR is working with Intel India and International Institute of Information Technology (IIIT), Hyderabad, to help achieve faster and less expensive COVID-19 testing and coronavirus genome sequencing to understand epidemiology and Artificial Intelligence (AI)-based risk stratification for patients with comorbidities.

As part of the initiative, Intel India is developing an end-to-end system that consists of multiple applications, testing devices, data collection/aggregation gateways, a data exchange software development kit (SDK) and an AI model-hub platform. CSIR's constituent labs such as CSIR-IGIB, CSIR-CCMB, CSIR-IMTECH, CSIR-IIP, CSIR-CLRI and others will work with various hospitals and diagnostic chains in carrying out comprehensive diagnostics. IIIT-Hyderabad will develop risk stratification algorithms that can help in drug and vaccine discovery for long-term preparedness to combat the epidemic.

“Multi-disciplinary partnerships are key to tackling the challenge of COVID-19 and CSIR is happy to collaborate with IIIT-Hyderabad and Intel India which bring in complementary strengths in genomics, big data and AI,” observed Dr Shekhar C. Mande, DG-CSIR.

Website link:

<https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-1-15MAY2020.pdf>

<https://www.csir.res.in/>

Scientists develop mobile indoor disinfection sprayer

Scientists at CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur, have developed two mobile indoor Disinfection Sprayer units. These units can be used for cleaning and disinfecting pathogenic micro-organism effectively, especially in hospitals.

Called Battery Powered Disinfectant Sprayer (BPDS) and Pneumatically Operated Mobile Indoor Disinfection (POMID), these units can be used to clean and disinfect frequently touched surfaces such as tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, sinks, and cardboards. Intermittent usage of these disinfecting units can help minimize the risk of transmitting coronavirus to people who inadvertently come in contact with those surfaces.

The sprayer systems in both BPDS and POMID are designed with two-stage spraying units and separate storage tanks to clean and disinfect the indoor areas by the numbers of fixed and flexible nozzles set in the lower and upper tiers. There is also an industrial variant of the Disinfectant Sprayer for heavy usage and to cover a larger area.

POMID mobile indoor disinfectant unit is made by steel frames mounted on four wheels. This system comprises compressors, piping and fittings and spray nozzles. The hand-held flexible spray arm can be used in any direction as per requirement. POMID unit has two storage tanks each with a capacity of 10 litres. BPDS unit is a cordless machine with a two-nozzle spray system and an extended arm spray unit. It has a storage capacity of 20 litres and a battery back-up time of 4 hours in a single charge. The gross weight of the system is (empty tank) 25 kg.

Website link:

<https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-2-15MAY2020.pdf>

<https://www.cmeri.res.in/>

कोविड-19 के खिलाफ महत्वपूर्ण हो सकती है यह साझेदारी

कोविड-19 के उपचार के लिए आयुर्वेदिक दवाओं के परीक्षण के बारे में काउंसिल ऑफ साइंटिफिक ऐंड इंडस्ट्रियल रिसर्च (सीएसआईआर) के महानिदेशक डॉ शेखर सी. मांडे ने कहा है कि "आधुनिक विज्ञान के दृष्टिकोण से आयुर्वेद की वैधता के परीक्षण के लिए सीएसआईआर और आयुष मंत्रालय की साझेदारी ऐतिहासिक है। दोनों संस्थान इस पर मिलकर काम करेंगे, जिससे हमें उम्मीद है कि इतिहास में छिपे तथ्य उभरकर सामने आ सकते हैं।" डॉ मांडे ने यह बात अपने एक ट्वीट के माध्यम से कही है।

आयुष मंत्रालय के राज्यमंत्री (स्वतंत्र प्रभार) श्रीपद येसो नाइक ने भी ट्वीट करके कहा है कि – "आयुष और सीएसआईआर कोविड-19 महामारी के खिलाफ चार आयुर्वेद आधारित यौगिकों को मान्य करने पर एक साथ काम कर रहे हैं। इससे संबंधित परीक्षण एक सप्ताह के भीतर शुरू हो जाएंगे। कोविड-19 रोगियों के उपचार के लिए इन यौगिकों को अतिरिक्त थेरेपी और मानक देखभाल के रूप में आजमाया जाएगा। मुझे उम्मीद है कि हमारी पारंपरिक औषधीय प्रणाली इस महामारी को दूर करने का रास्ता दिखा सकती है।"

सीएसआईआर और आयुष मंत्रालय मिलकर जिन चार आयुर्वेदिक यौगिकों का कोविड-19 के खिलाफ परीक्षण कर रहे हैं, उनमें अश्वगंधा, यष्टिमधु, गुडुची, पिप्पली और मलेरिया-रोधी दवा आयुष-64 शामिल हैं। हाल में केंद्रीय विज्ञान एवं प्रौद्योगिकी, स्वास्थ्य एवं परिवार कल्याण और पृथ्वी विज्ञान मंत्री डॉ हर्ष वर्धन ने इस संबंध में घोषणा की थी और कहा था कि सीएसआईआर और आयुष मंत्रालय इस पर मिलकर काम करेंगे। बताया जा रहा है कि तीन महीने में इस अध्ययन के परिणाम सामने आ सकते हैं।

Website link:

<https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-1-14MAY2020.pdf>

<https://www.csir.res.in/>

CSIR lab to reach out north-east villages through entrepreneurship drive

North East Institute of Science and Technology (NEIST) will make all possible efforts to reach out to about 500 villages of north-east India through its various entrepreneurship and skill development programmes in the aftermath of COVID-19 pandemic. This information was given by Dr. G Narahari Sastry, Director of the Institute. He was addressing the CSIR-NEIST fraternity on the occasion of the National Technology Day through e-mode.

Some of these programmes include CSIR-AROMA Mission, Rural Women Technology Park, Science and Technology Interventions in the North-East Region (STINER) and other similar societal missions of the Institute to facilitate innovation and entrepreneurship in the region. NEIST, based out of Jorhat, Assam, and a constituent laboratory of the CSIR, has taken up this initiative in concurrence with Institute's theme "Year of Revitalizing NEIST for Strengthening North East" for the year 2020.

Keeping in tune with the national theme for the day that is 'Rebooting the Economy through Science, Technology and Research Translations or 'RESTART', the institute had lined-up its various

activities for the National Technology Day. Notable among these was the entrepreneurship development programme for rural women under the STINER project. The programme was attended by 10 aspiring women entrepreneurs from CSIR-NEIST colony apart from online participation of other entrepreneurs from all over the state of Assam along with CSIR-NEIST staff members.

Website link:

<https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-1-13MAY2020.pdf>

<http://www.rrljjorhat.res.in/>

लॉकडाउन में छात्रों के लिए सीएसआईआर-निस्केयर की ऑनलाइन प्रतियोगिता

कोविड-19 के संक्रमण को फैलने से रोकने के लिए चल रहे लॉकडाउन के दौरान छात्र सृजनशील बने रहें, इसके लिए काउंसिल ऑफ साइंटिफिक ऐंड इंडस्ट्रियल रिसर्च (सीएसआईआर) से संबद्ध नेशनल इंस्टीट्यूट ऑफ साइंस कम्युनिकेशन ऐंड इन्फॉर्मेशन रिसोर्सिज (निस्केयर) एक प्रतियोगिता का आयोजन कर रहा है। हिंदी और अंग्रेजी माध्यम में आयोजित की जा रही इस प्रतियोगिता का मुख्य विषय "कोरोनावायरस-एक अदृश्य शत्रु" है।

निस्केयर द्वारा संचालित इन प्रतियोगिताओं में चित्रकला प्रतियोगिता, निबंध प्रतियोगिता और मोबाइल वीडियो प्रस्तुतिकरण प्रतियोगिता शामिल हैं। यह प्रतियोगिता दो वर्गों के छात्रों को ध्यान में रखकर आयोजित की जा रही है। प्रतियोगिता के पहले वर्ग में कक्षा पांचवीं से आठवीं और दूसरे वर्ग में कक्षा नौवीं से बारहवीं तक के छात्र शामिल हो सकते हैं। यह एक ऑनलाइन प्रतियोगिता है, जिसमें सिर्फ भारत के नागरिक शामिल हो सकते हैं।

पहले वर्ग में शामिल छात्रों के लिए चित्रकला प्रतियोगिता का विषय 'कोविड-19 की रोकथाम के लिए सामाजिक दूरी एवं स्वच्छता का महत्व' रखा गया है। जबकि, दूसरे वर्ग के छात्रों के लिए चित्रकला प्रतियोगिता का विषय 'कोरोनावायरस- विश्वव्यापी महामारी-बदलता जीवन' है। निबंध लेखन प्रतियोगिता में छात्रों को एक हजार शब्दों में निबंध लिखना होगा। पहले वर्ग के छात्रों के लिए निबंध प्रतियोगिता का विषय 'लॉकडाउन के दौरान जीवन' और दूसरे वर्ग के अंतर्गत 'घर में विद्यालय आ पहुंचा' विषय रखा गया है। मोबाइल वीडियो प्रस्तुतिकरण प्रतियोगिता के तहत छात्रों को दो मिनट का वीडियो बनाकर भेजना होगा, जिसके विषयों में 'लॉकडाउन के दौरान मैं सबसे अधिक किन चीजों की कमी महसूस कर रहा हूँ' और 'गलत सूचना महामारी के लिए बड़ा खतरा' शामिल है।

Website link:

<https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-2-13MAY2020.pdf>

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

Projects selected against CSIR-NMITLI for tackling COVID-19

CSIR is leading the fight against COVID-19 using multi-pronged approach and multiple models of engagement. CSIR labs are developing technologies and products and are working with industry and public sector undertakings for deployment. CSIR, through its New Millennium Indian Technology Leadership Initiative (NMITLI), has several projects to combat COVID-19. NMITLI is a flagship programme of CSIR aimed to support new ideas and projects from academic institutions and industries.

Recently CSIR, through NMITLI programme, has approved a project towards development of human monoclonal antibodies (hmAbs) that can neutralize SARS-CoV-2 in patients. This project on generation of neutralizing human monoclonal antibodies as a therapeutic strategy will be implemented by a multi-institutional and multi-disciplinary team. Monoclonal antibody therapy is a form of immunotherapy designed to produce immunity to a disease or to enhance

resistance by the immune system. Apart from this, following projects have also been selected under CSIR-NMITLI programme for tackling COVID-19:

- Development of an indigenous, affordable neonatal to an adult ventilator to be used for mechanically ventilating multiple patients with respiratory failure, simultaneously;
- Development of a Portable Respiratory Assistive Device;
- Development of an accurate, affordable point-of-care Diagnostics kit for COVID-19;
- Development of a multi-omics-based machine learning algorithm to predict the clinical course and prognosis of COVID-19 patient;
- Development of Mycobacterium W for COVID-19: Safety and Efficacy Trial in critically ill, hospitalized and at risk patients;
- Development of an inactivated SARS-CoV-2 vaccine for COVID-19 (ICoV2Vac);
- Development of the most appropriate manufacturing process for the production of two important drugs to treat COVID-19 disease; and
- Generation of neutralizing human monoclonal antibodies against the SARS-CoV-2 virus as a therapeutic strategy to contain the COVID-19 pandemic.

Website link:

<https://www.csir.res.in/approval-under-nmitli>

<https://www.csir.res.in/>

NCL develops facemask with better filtration efficiency

National Chemical Laboratory (NCL), Pune, has developed a facemask with better filtration efficiency compared to those available in the market. Scientists at NCL, a constituent of CSIR, have used the Institution's patented bacterial nano cellulose technology along with nano coating to develop the new facemask.

The cotton cloth coated in a solution of bacterial cellulose and nano material has been found to be effective in preventing the penetration of bacterial growth, indicating promise as a material for facemask filter. A team of scientists, led by Dr. Syed Dastager, Dr. Mahesh Dharne and Dr. Shubhangi Umbarkar prepared the prototype of the facemask using Spun bond polypropylene medical grade cloth to evaluate bacterial filtration efficiency (BFE), particulate filter efficiency (PFE), breathability, flammability, and splash resistance.

Coimbatore-based South India Textile Research Association (SITRA), a government-approved certifying nodal agency for medical textiles, conducted these tests on CSIR-NCL's sample facemasks for confirming the quality. The BFE of the CSIR-NCL mask is 99.9% according to the ASTM (formerly known as American Society for Testing and Materials) standard using aerosols of human pathogen, Staphylococcus aureus, found in the upper respiratory tract and on the skin.

Website link:

<https://vigyanprasar.gov.in/wp-content/uploads/Vigyan-Samachar-CSIR-News-2-18MAY2020.pdf>

<https://www.ncl-india.org/>

भारत में बढ़ रहा है कोरोना वायरस की जीनोम सीक्वेंसिंग का आंकड़ा

भारत में विभिन्न वैज्ञानिक संस्थान मिलकर कोरोना वायरस की जीनोम सीक्वेंसिंग कर रहे हैं। अब तक देश के विभिन्न वैज्ञानिक संस्थानों में कोरोना की करीब 300 जीनोम सीक्वेंसिंग की जा चुकी है। इसमें से 200 सीक्वेंसिंग वैज्ञानिक तथा औद्योगिक अनुसंधान संस्थान (सीएसआईआर) द्वारा की गई है। यह जानकारी सीएसआईआर के महानिदेशक डॉ शोखर सी. मांडे द्वारा एक राष्ट्रीय चैनल पर दिए गए साक्षात्कार के दौरान दी गई है।

कोरोना वायरस से लड़ने के लिए वैक्सीन के विकास के लिए इसकी आनुवांशिक संरचना का पता लगाना बेहद जरूरी है। यही कारण है कि दुनियाभर के वैज्ञानिक कोरोना वायरस की जीनोम सीक्वेंसिंग करने में जुटे हुए हैं। डॉ मांडे ने कहा है कि हमारे देश में भी सिविअर एक्यूट रिस्पेरेटरी सिंड्रोम-कोरोना वायरस-2 (SARS-CoV-2) की सीक्वेंसिंग काफी तेजी से चल रही है। नई दिल्ली स्थित सीएसआईआर-जिनोमिकी और समवेत जीव विज्ञान संस्थान (आईजीआईबी) और हैदराबाद स्थित सीएसआईआर-कोशकीय एवं आणविक जीवविज्ञान केंद्र (सीसीएमबी) सीक्वेंसिंग को लेकर मुख्य रूप से काम कर रहे हैं।

जीनोम सीक्वेंसिंग से पता चलता है कि वायरस किस जीनोम का बना हुआ है। इसके अलावा, वायरस में पाये जाने वाले आरएनए से उसकी आनुवांशिक बनावट के बारे में काफी जानकारियां मिल सकती हैं। कोरोना वायरस के बारे में यह भी कहा जा रहा है कि यह लगातार रूपांतरित हो रहा है। सीक्वेंसिंग से वायरस के रूपांतरित होने के बारे में भी जानकारी मिल सकती है। वैज्ञानिकों का कहना है कि सीक्वेंसिंग से प्राप्त जानकारी से वैक्सीन के विकास में मदद मिल सकती है। जीनोम सीक्वेंसिंग वायरस के प्रति वाहक की प्रतिक्रिया का पता लगाने और बीमारी के प्रति जनसंख्या की संवेदनशीलता की पहचान करने में भी महत्वपूर्ण हो सकती है।

Website link:

<https://www.csir.res.in/>

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

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

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, Neisseria, etc.



Website link:

<https://pib.gov.in/PressReleasePage.aspx?PRID=1623782>

ICMR releases list of state-wise mentor institutes for COVID-19 diagnostics

ICMR has identified and released a list of mentor institutes along with their allocated states. These mentor institutes have been identified for various states and are mandated to review the requests for approving any new laboratory for COVID testing.

Website link:

https://main.icmr.nic.in/sites/default/files/upload_documents/Mentor_Institutes.pdf

India forges ahead towards developing 'fully indigenous' COVID-19 vaccine as ICMR partners with Bharat Biotech

The ICMR announced a tie-up with the Bharat Biotech International Limited (BBIL) for the development of a fully indigenous vaccine for Covid-19. According to the ICMR, the virus strain has been isolated at the National Institute of Virology (NIV) laboratory in Pune and will be used to develop the vaccine. The strain has been successfully transferred from NIV to BBIL and work on vaccine development has been initiated.



Website link:

<https://theprint.in/health/india-to-develop-fully-indigenous-covid-vaccine-as-icmr-partners-with-bharat-bio-tech/418180/>

NIV Pune develops COVID Kavach Elisa for COVID-19 testing

ICMR-National Institute of Virology (NIV) at Pune has developed and validated the indigenous IgG ELISA test 'COVID KAVACH ELISA' for antibody detection for COVID-19. The test was validated at two sites in Mumbai and has been found to have high sensitivity and specificity. In addition, the test will have the advantage of testing 90 samples together in a single batch run within 2.5 hours. The enzyme-linked immunosorbent assay (ELISA) can detect and measure IgG antibodies in blood samples.

Website link:

<https://twitter.com/ICMRDELHI/status/1259809990413410305>

#ICMRFIGHTSCOVID19

ICMR HAS DEVELOPED THE FIRST INDIGENOUS HUMAN ELISA COVID-19 TESTING KIT

#MakelIndia
Developed in a month's time it would help to study the presence of anti-SARS CoV-2 IgG antibodies in the Indian population and vaccine development.

#TechnologyTransfer
Technology has been transferred to Zydus Cadila in record time for mass production of the ELISA kit to ensure early supply of kits.

#UserFriendly
Cost-effective, sensitive, rapid, and a large number of samples can be tested at any level of clinical setting, public health centers, and hospitals.

Department of Health Research, Ministry of Health and Family Welfare, Government of India.
For more information, please visit: icmr.in

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION (DRDO)

DRDO lab develops automated UV systems to sanitise electronic gadgets, papers and currency notes

Hyderabad-based premier lab of DRDO, Research Centre Imarat (RCI), has developed an automated contactless UVC sanitisation cabinet, called Defence Research Ultraviolet Sanitiser (DRUVS). It has been designed to sanitise mobile phones, iPads, laptops, currency notes, cheque leafs, challans, passbooks, paper, envelopes, etc.

DRUVS cabinet: The cabinet is having contactless operation which is very important to contain the spread of virus. The proximity sensor switches, clubbed with drawer opening and closing mechanism, makes its operation automatic and contactless. It provides 360 degree exposure of UVC to the objects placed inside the cabinet. Once the sanitisation is done, the system goes in sleep mode hence the operator need not wait or stand near the device.



NOTESCLEAN: The RCI has also developed an automated UVC currency sanitising device, called NOTESCLEAN. Bundles of currency notes can be sanitised using DRUVS; however, disinfection of each currency notes using it will be a time consuming process. For that purpose, a sanitising technique has been developed, where one has to just place the loose currency notes at the input slot of the device. It picks the notes one by one and makes them pass through a series of UVC lamps for complete disinfection.



Website link:

<https://pib.gov.in/PressReleasePage.aspx?PRID=1622692>

Patenting of Innovative Low Cost PPE developed by Indian Navy paves way for Rapid Mass Production

DRDO tests the PPE developed by Indian Navy and clears for production of the same. The sample was tested at INMAS of DRDO and clearance was given for production. Indian Navy developed Personal Protective Equipment (PPE) and a patent has been successfully filed by the Intellectual Property Facilitation Cell (IPFC) of Ministry of Defence, in association with National Research Development Corporation (NRDC), an enterprise under Ministry of Science & Technology.

The low cost PPE has been developed by a doctor of Indian Navy, posted at the recently created Innovation Cell at Institute of Naval Medicine (INM), Mumbai. A pilot batch of PPEs has already been produced at Naval Dockyard Mumbai.

The PPE developed by the Navy is made of a special fabric which affords high level of protection along with high 'breathability' as against other PPEs available in the market and is therefore more suitable for use in hot and humid weather conditions as prevalent in India. The technology has also been tested and validated by ICMR-approved Testing Lab.

Concerted efforts are now ongoing by a core team of Navy, IPFC and NRDC to commence mass production of this low cost PPE. Eligible firms are being identified by NRDC for taking up licensed production of the PPEs on a fast track. A significant and urgent requirement in the fight against the Coronavirus is the need to equip our frontline healthcare professionals with comfortable PPEs, which can be produced indigenously at an affordable cost without much capital investment. The firms/start-ups interested to take up licensed production may approach cmdnrdc@nrdcindia.com.

The team of innovators from Navy is working in close coordination with IPFC which was set up under Mission Raksha Gyan Shakti. Since its launch in November 2018, around 1500 IP assets have been created under this Mission.

Website link:

<https://pib.gov.in/PressReleasePage.aspx?PRID=1623776>



SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

OTHER SCIENTIFIC AND ACADEMIC INSTITUTIONS

Technologies to tackle covid-19 pandemic from IIT Kanpur

Indian Institute of Technology Kanpur (IITK) is offering an integrated set of end-to-end industrially scalable and commercially viable solutions to deal with various challenges at every stage of the COVID-19 pandemic. Faculties from various departments and the incubated companies of its Technology Business Incubator -- Startup Innovation Incubation Centre (SIIC) have been assiduously working to develop rapidly scalable range of products and services for COVID-19 prevention, protection and management. IIT Kanpur is also part of group called Caring Indians that has gathered innovation enthusiasts from across the country where IITK is providing both technical and business mentoring through its alumni and their connects in whatever way possible. The proposed technologies can be deployed nationally and across the ASEAN region wherever needed through technology transfer.

PREVENTION:

Contact tracing and fake news verification App: The users of social media apps can easily check whether the news received is a fake one (in a comparatively simpler manner). This can be used with non-smart phone also and thus deployable in areas of limited telecom connectivity.



Alternative to current Surgical and N-95 masks: The team of researchers tested various available filter media and developed a low-cost protective respirator which is equivalent or better than N95. It will have a filter testing rig equipped with an aerosol laser spectrometer and a non-woven polypropylene based 3-4 layer material. After identifying the appropriate material, the mask will be made manually, considering the accessibility of ultrasonic welding machine and automatic manufacturing machines.

CONTAINMENT:

Personal Protective Equipment Kits for medical staff and essential workers: IITK has designed PPE Kits based on thin cylindrical rolls and pipes of polyethylene, which is non-porous and commonly used in the industry for packaging and making plastic bags. Polythene is airtight and will provide required protection. The technology is made open source for anybody to make it. It is easy to scale, cost effective and relevant particularly as imported kits are difficult to get.

SURAKSHA KIT - whole body protection wearable by Aarna biomedical products: A holistic full-body disposable wearable kit (named as SURAKSHA) has been developed for self-protection of personnel in vulnerable environments. It comprises of a full-face shield, face mask, a coverall with fused head coverage, shoe covers and hand covers. The kit is tenable and implementable after immediate funding support and approvals for logistics and manufacturing.

MANAGEMENT:

Disinfection chamber - Two-stage Innovative Process for Human Disinfection for Controlled Access: This proposal focuses on innovatively combining two common disinfection approaches (Soap-based solutions and covering others surfaces) followed across the world to achieve a new and cost-effective disinfection process that is safe for human beings.

Website link:

<http://www.iitk.ac.in/new/data/IITK-Technologies-for-COVID-19-pandemic-in-ASEAN.pdf>

IIT Bhubaneswar develops a 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



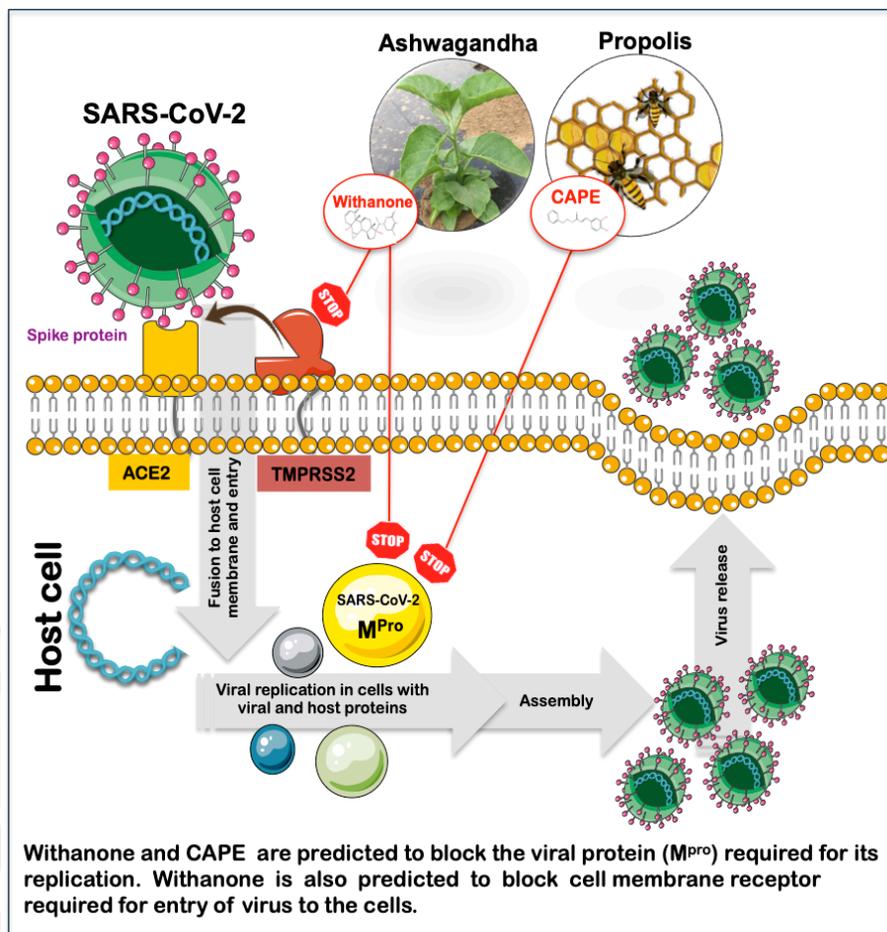
of the critical structural members have been 3D printed. The highlight of this PRAAN ventilator is its active assist control mode. In this mode of operation the ventilator senses that the patient is trying to inhale and will adapt to the patient's breathing frequency, reducing the load on the lungs. 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 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-covidashwagandha.php>

https://www.india.gov.in/news_lists?a591236905

SCIENCE & TECHNOLOGY EFFORTS ON COVID-19

BY

PRIVATE SECTOR ENTERPRISES

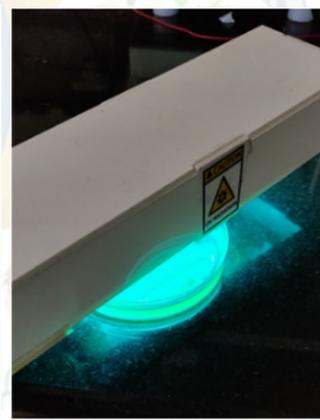
Pune-based PadCare Labs develops UV-based sanitization system to combat COVID-19

PadCare Labs from Pune is an innovation-driven company solving unmet need of menstrual waste management which is providing safe, accessible & eco-friendly decontamination system, to sanitize inanimate objects through institutional organizations by novel UV design technology which is instant, portable and cost-effective in operation unlike traditional chemical sanitizers.

The germicidal range of UV light, known as UVC, deactivates bacteria, viruses, and other microbes by attacking their DNA. UVC light is able to penetrate the cells of microorganisms and disrupt the structure of the DNA molecules. The microorganisms, in turn, lose their reproductive capability and are destroyed, rendering them inactive and no longer harmful. The germicidal nature of UVC is well-suited to treat microorganisms which become extremely resistant to chemical disinfectants, as they are unable to develop immunity to UVC light. Two such UV-based products for sanitization and disinfection of area and inanimate objects are UVSAN & UVHandy.



UVSAN
Area Sanitizer



UVHandy
Portable Sanitizer

UVSAN: It is used to disinfect the larger areas like hospitals, ambulance, shopping malls and PPEs etc.

UVHandy: It is used for disinfection of inanimate objects.

Website link:

<https://padcarelabs.com/covid19/>

Tech Mahindra designs COVID-19 Protein Comparison Analysis

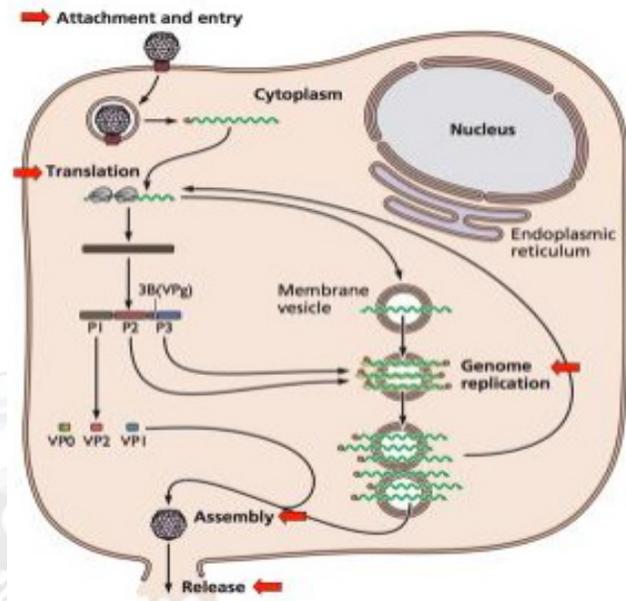
Tech Mahindra designs COVID-19 Protein Comparison Analysis using a computational statistics method. The design principle is based on a common software principle called YAGNI. This principle has been designed to simplify the process and act of writing code,

so that it affects the most where needed, without changing the entire underlying premise. It is known that protein structures and shape do affect the way proteins behave but as a starting point the peptide chains in Corona were observed and compared with peptide chains in other viruses of similar types. The basic idea was if a chemical compound is known to act on one, it might give scientists a head start to act on this virus.

Since these are experimental conclusions drawn numerically, these need to be validated by labs and other practitioners.

Website link:

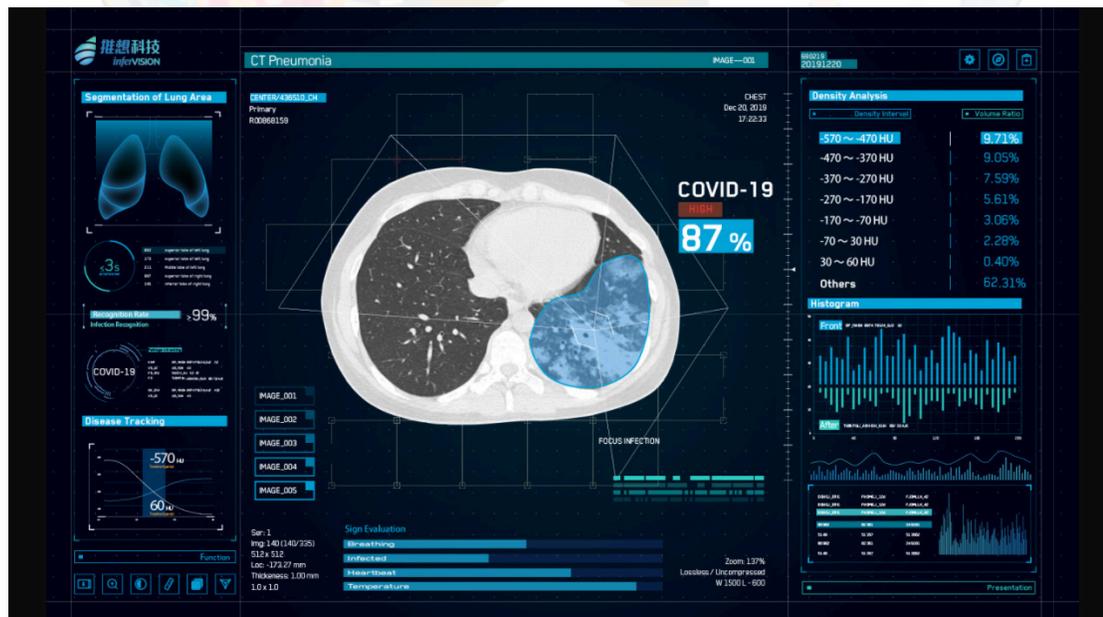
https://entellio3.techmahindra.com/covid19_research/COVID-19%20Protein%20Comparison%20Analysis.pdf



Source: Vincent Racaneillo course

Bengaluru-based Artelus develops AI-powered COVID-19 screening software

Artelus has developed an artificial intelligence (AI)-powered COVID-19 screening software. Through this software, if one uploads a chest X-ray (or a photo of the X-ray), the system can identify COVID-19, Pneumonia, and Tuberculosis. Results from reading thousands of X-rays have showed that the system can achieve accuracy comparable to radiologists (above 90% sensitivity and above 80% specificity across conditions). The accuracy has been achieved by using more than 1.3 lakh images for pre-training, training and testing. This solution is also available offline on a stick that can be connected to any X-ray machine and computer for AI readings.



With this solution, the large network of radiologists with X-ray facilities can become the first centre for filtration. Through this screening, only COVID-19-positive patients can be sent to the State-appointed screening centres thus reducing the burden and allowing efficient operations. This solution has been developed to support the fight against the pandemic outburst.

Contact Info: Dr Girish Somvanshi; gsomvanshi@artelus.com

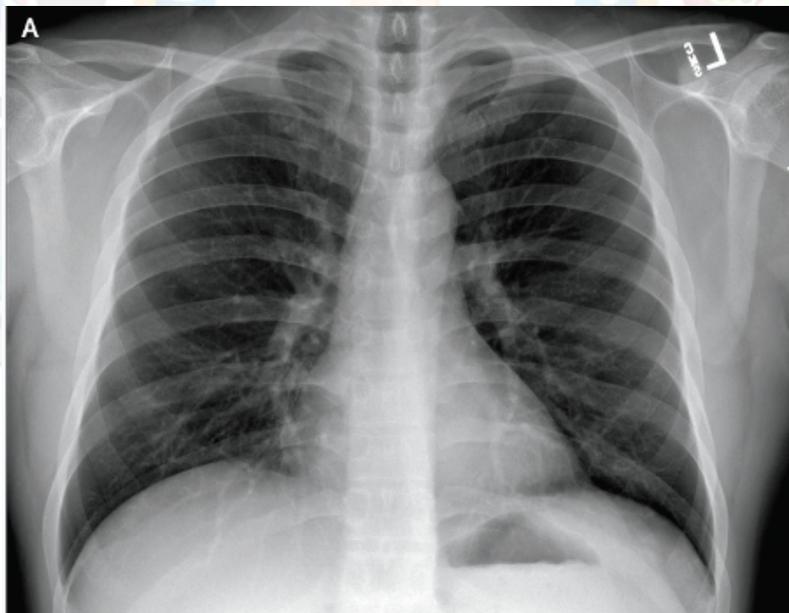
Website link:

<https://artelus.com/index.php>

COVID-19 detection AI Service using chest X-Rays

AI Bharata has developed an R&D Artificial Intelligence (AI) Prototype for COVID-19 infection detection using chest X-Rays. The current AI model can detect and differentiate between NORMAL, PNEUMONIA, and COVID-19, with an Accuracy of 99.3% on training data and has an accuracy of 91.3% on validation data. Validation data consists of X-Ray images of patients, which was not used during training. This demonstrates that AI can learn from a set of patients and use it to detect the infection on other patients.

One of the holy grail of AI is that it can be used to identify factors and pointers that are not known to humankind yet, to detect the onset of novel infections such as COVID-19. AI Bharata believes that it can uncover detection factors that are not yet known in the literature or to doctors for identifying the progression of this novel COVID-19 virus. AI Bharata is a stealth mode start-up focused on developing next-generation AI products, services and emerging technologies including but not limited to Super-Intelligence, Cybernetics, Neuromorphic Computing, and Medical AI.



Prediction: COVID-19

Website link:

<https://covid19.aibharata.com/>

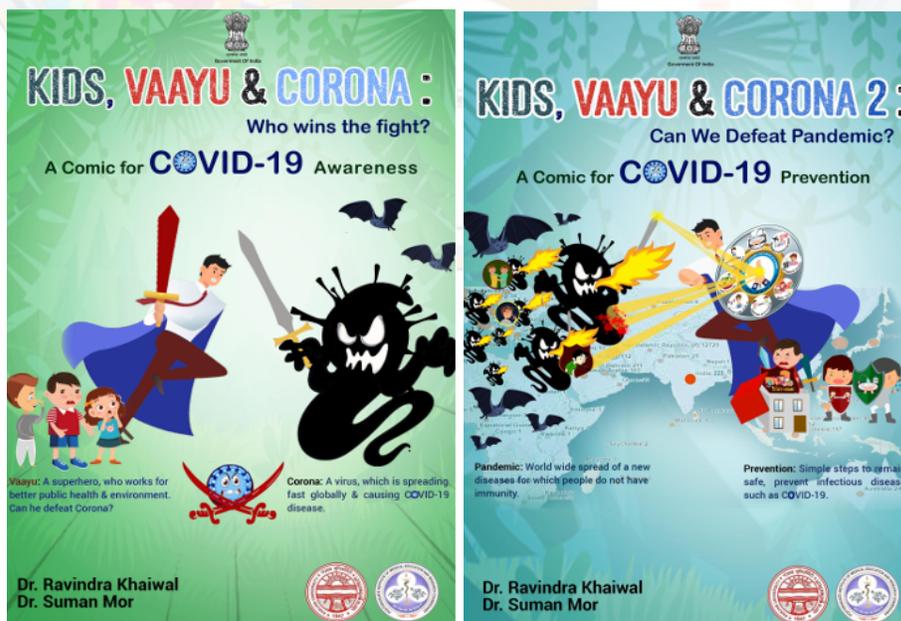
SCIENCE OUTREACH & POPULARISATION EFFORTS

Ministry of Science and Technology (MoST), Government of India, is striving continuously for reaching to the common people. Since the eruption 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

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 incomprehensible 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.

The logo here in this e-Newsletter has been reproduced from the comic series published jointly by Postgraduate Institute of Medical Education and Research (PGIMER, Chandigarh) and Panjab University (PU) to address the challenge of making kids sensitive and aware about the prevention of transmission and spread of the novel coronavirus infection. The logo designed by them portrays a shield of public health approach to fight with the infection and depicts the efforts of corona warriors.



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Dr Suman Mor; sumanmor@pu.ac.in

Website link:

https://www.mohfw.gov.in/pdf/Corona_comic_PGI.pdf
<https://www.mohfw.gov.in/pdf/CoronaComic2PGIPU22Mar20.pdf>

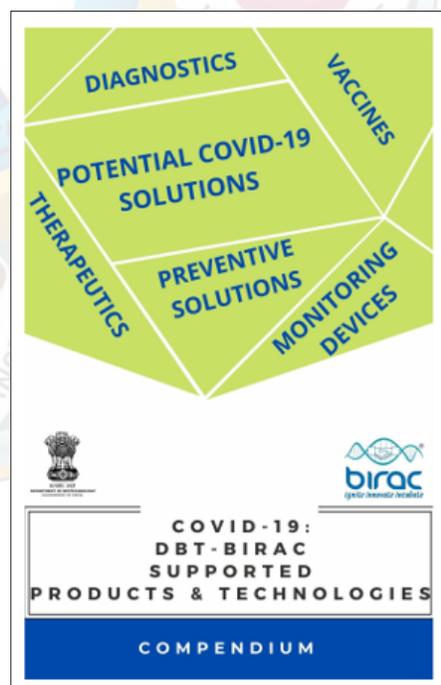
DBT-BIRAC brings out a compendium of Indian products, technologies and innovations for combating COVID-19

Biotechnology Industry Research Assistance Council (BIRAC), a non-profit Public Sector Enterprise of Department of Biotechnology (DBT) brings out a compendium that showcases several innovations from all programmes that are being nurtured to move them forward in the innovation pipeline. This Compendium provides products, technologies and innovations developed by various start-ups on multiple aspects of mitigating the COVID-19 pandemic.

The Compendium enumerates the COVID-19-related products that are already commercialized, to be commercialized within next six months, research pipeline and additional facilitations towards mitigation of novel coronavirus outbreak.

Website link:

https://www.birac.nic.in/webcontent/Birac_Compndium_2020.pdf



Efforts from Vigyan Prasar

India Science Channel

India Science is an Internet-based Over-The-Top (OTT) Science TV channel. It is an initiative of the Department of Science and Technology (DST), Government of India, implemented and managed by Vigyan Prasar (VP), an autonomous organisation of Department of Science and Technology. This 24×7 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 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, advantages of science and technology must reach all sections of the 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.

1. Daily video bulletin in Hindi and English;
2. COVID Explained - Short films to explain research project findings in layman's lingo; and
3. Short videos on COVID-19 with experts.
4. Vigyan Prasar also did the webcast of special talk on 'Scientific Social Responsibility' regarding COVID-19.

Contact info: kapil@vigyanprasar.gov.in

Website link:

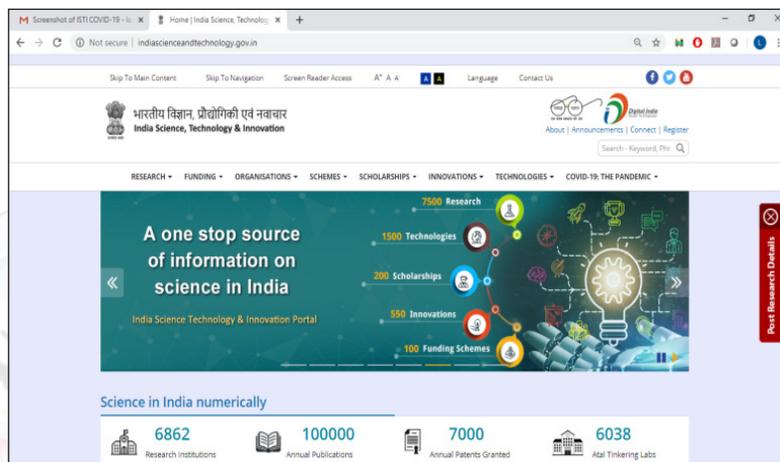
<https://www.indiascience.in/>



India Science, Technology and Innovation (ISTI) Web Portal

The India Science, Technology and Innovation Portal (ISTI) is a one-stop window for information about developments in India on science, technology and innovation. The portal focuses on bringing all stakeholders and Indian STI activities on a single online platform; helping efficient utilisation of resources; highlighting functioning of scientific organisations, laboratories and institutions; aggregating information on science funding, fellowship & 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.

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.

Contact Info: kdgm@vigyanprasar.gov.in

Website link:

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

Weekly Publication of e-Newsletter on COVID-19

For the benefit of its stakeholders, 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/>

