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

28TH MAY 2021

COVID-19

Science & Technology Efforts in India

FORTNIGHTLY EDITION

- GUIDELINES & SOPS
- FUNDING OPPORTUNITIES
- INDUSTRY COLLABORATIONS
- MEDICAL OXYGEN
- START-UP SPOTLIGHTS
- RESEARCH SUPPORTS
- COMMUNICATION & RESOURCES
- FACT-CHECKS & FAQS

VOL. IV | ISSUE 3

A compilation of all impactful efforts & scientific contributions towards mitigation of second wave of COVID Pandemic

PREFACE

In 2020, India dealt with the first wave of COVID-19 pandemic with collective measures, scientific approach, and awareness. Undoubtedly the second wave of the pandemic is testing our patience and the extent to which we can all tolerate its fangs. The impact of the second wave has seen shortage of medical oxygen across the nation. But, the intelligent use of technology and well-planned resource allocation to tackle the new wave of the pandemic has been dealt with at a war-footing. The current edition, COVID 2021: Nation's S&T Efforts Against COVID-19, has been compiled to inform our readers and strengthen the usefulness of any published information. This edition contains compilation and coverage of information related to the capacity enhancement of medical oxygen, start-up spotlights, research contributions, and so on.

To bridge the gap among scientific contributions, leadership and administrative efforts, and the perspective of the general public, Vigyan Prasar is continuously reaching out to its audiences in the shape of a regular e-newsletter, taking its mandate of science communication, popularisation and extension to the next level. Our effort is firmly based on the fact that "Science gathers knowledge faster than society gathers wisdom". The steady increase in the number of recoveries and the significant and continuous decrease in positivity rate provide us the much-needed assurance that this may be the outcome of improving the health infrastructure and making health the cornerstone at the policy level.

We wish an engaging reading to our audiences across all strata of the society and look forward to suggestions and feedback at covidnewsletter@vigyanprasar.gov.in. Hopefully, the coverage about how the country is overcoming challenges with the help of knowledge will instil in our readers confidence and trust in the country's scientists and scientific administrators, which would ultimately result in inculcating scientific temper. Together we can and we will beat the pandemic out. Till then, we are committed to following COVID Appropriate Behaviours (CABs).

28 May 2021

Vigyan Prasar
New Delhi

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

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

I

INFORMATION OF IMMEDIATE USAGE

The up-to-date information related to guidelines, standard operating prpcedure (SOPs), regulations, etc., released by various apex bodies, government departments and ministries are compiled here in a ready-to-use manner. Reference links and contact information are made available wherever possible.

INFORMATION OF IMMEDIATE USAGE

MoHFW releases SOP on COVID-19 containment & management in peri-urban, rural & tribal areas

Ministry of Health and Family Welfare (MoHFW) has recently issued SOP on COVID-19 containment and management in peri-urban, rural and tribal areas. With the larger spread of COVID-19 cases in peri-urban, rural and tribal areas, it is important to ensure that community-based services and primary-level health infrastructure in these areas are equipped and oriented to manage COVID-19 cases. Primary healthcare facilities and health facilities in the private sector in these areas play a significant role in delivering health services to population. This SOP outlines containment and clinical management practices to be put in place in these areas with respect to COVID-19 management.

Website Link:
https://www.mohfw.gov.in/pdf/SOPonCOVID19Containment&ManagementinPeriurbanRural&tribalareas.pdf

ICMR releases advisory for COVID-19 home testing using Rapid Antigen Tests

The Indian Council of Medical Research (ICMR) issued an advisory for COVID-19 home testing using Rapid Antigen Tests (RATs) in view of the second wave of COVID-19 pandemic. In the advisories, the ICMR stated that individuals who test positive may be considered as true positives, and no-repeat testing is required. All symptomatic individuals who test negative must get tested by RT-PCR as RATs are likely to miss few positive cases with low viral load.

ICMR has approved "CoviSelfTM (PathoCatch) COVID-19 OTC Antigen LF device" kit for home testing. The kit has been developed by Mylab Discovery Solutions Ltd, Pune.

Detailed information along with instructions for use is available at website http://coviself.com/ifu/ in English and Hindi and video link for demonstration along with illustrated video In English and Hindi is available at website http://coviself.com/video/.

Website Link:
https://www.icmr.gov.in/pdf/covid/kits/Advisory_Home_Test_kit_19052021.pdf

Revised COVID-19 Clinical Management Protocol Algorithm (Adults)

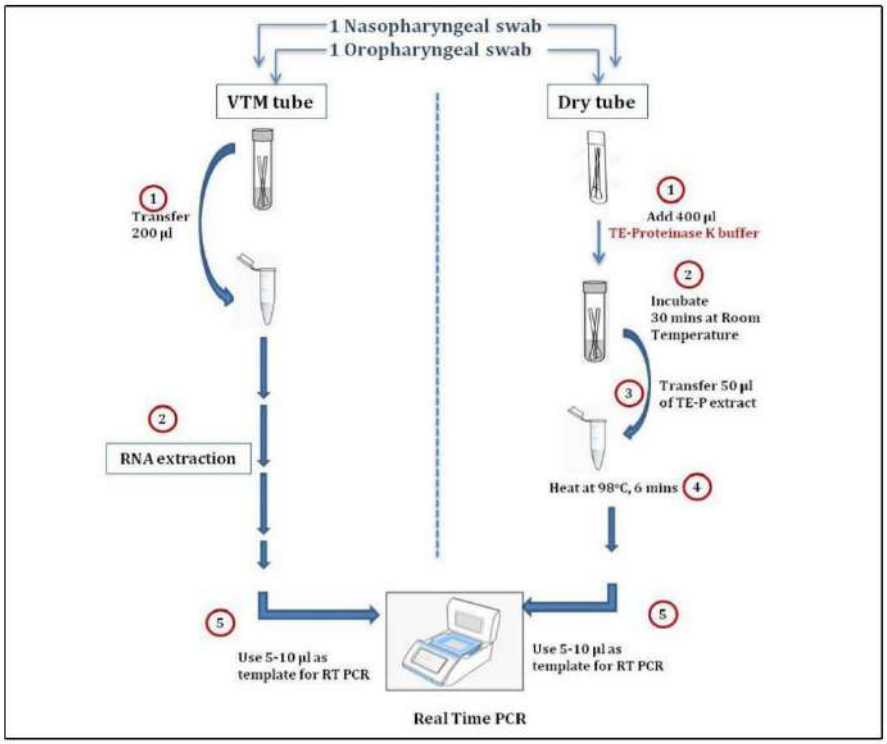
The All India Institute of Medical Science (AIIMS) and the Indian Council of Medical Research (ICMR) have jointly issued revised COVID-19 Clinical Management Protocol Algorithm (Adults) for the treatment of COVID-19 patients depending on the severity of a case — Mild, Moderate, or Severe. It explained in details the treatment for mild, moderate and severe

COVID-19 cases which includes way of identification, recommendations, required oxygen support, use of medication or drugs, Dos and Don'ts, supportive measures and monitoring of health parameters, etc.

Website Link:
https://www.mohfw.gov.in/pdf/COVID19ClinicalManagementProtocolAlgorithmAdults19thMay2021.pdf

ICMR issued advisory on use of dry swab RNA extraction-free RTPCR method developed by CSIR-CCMB

An advisory has been issued by Indian Council of Medical Research (ICMR) on use of RNA extraction-free dry swab method for RTPCR-based detection of SARS-CoV-2 developed by CSIR-Centre for Cellular & Molecular Biology (CCMB) Hyderabad. The method will save time and reduce cost as compared to standard PCR tests using Viral Transport Medium (VTM) and RNA extraction. This method involves collection of a VTM-less dry oropharyngeal/nasopharyngeal swab from suspect SARS-CoV-2 patients. The swab is then transported to the lab wherein Tris-EDTA - Proteinase K buffer is added, and the sample is incubated for 30 minutes at room temperature. The sample is then subjected to heat inactivation at 98°C for 6 minutes. The extract is then used for RTPCR. The comparative methodology is shown with the help of a flow diagram.



Website Link:
https://www.icmr.gov.in/pdf/covid/techdoc/Advisory_Dry_Swab_RNAExtraction_20042021_.pdf

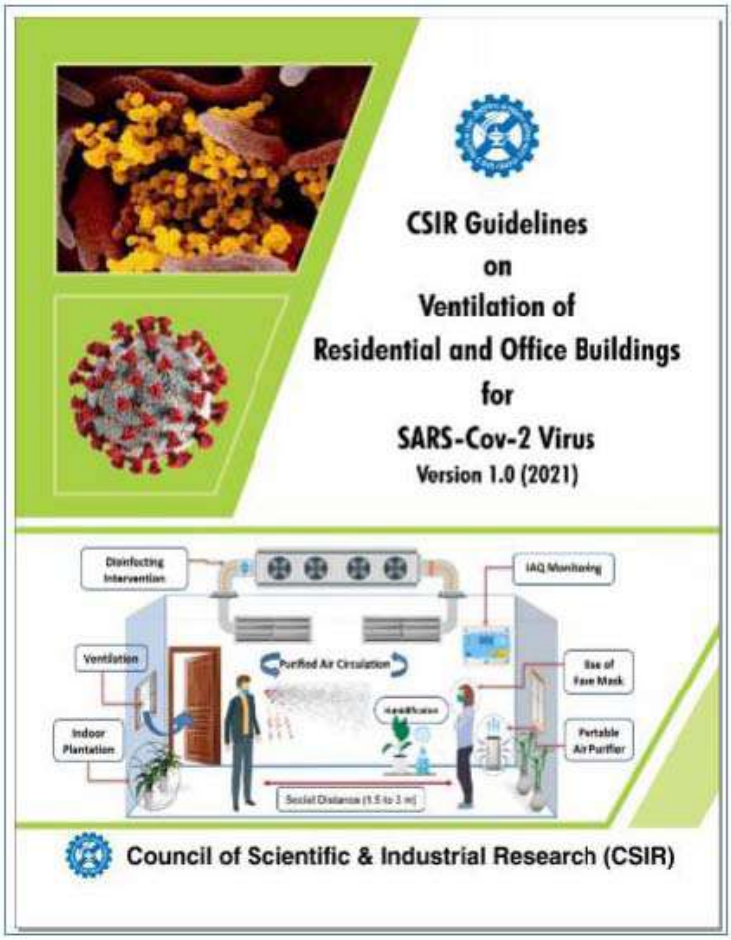
CSIR releases guidelines on ventilation of residential and office buildings for protection from SARS-CoV-2

The COVID-19 pandemic, caused by the infectious virus SARS-CoV-2, has brought into focus COVID-appropriate behaviour, which includes use of masks, social distancing and air ventilation as non-pharmacological approaches to combat the spread of infection. Thus, CSIR has come out

with guidelines for ventilation in residential buildings and offices to mitigate effect of COVID-19 transmission.

The most effective manner of reducing the effects on any contaminant is by dilution with fresh air, and thus there is a need of a paradigm shift in ventilation from space-focused design to occupant-focused design. In general, the ventilation and indoor environmental systems must focus on source control and advanced air distribution and provide healthy and comfortable micro environment to each occupant when, where, and as much as needed. Looking into the minimum recommended ventilation rates of 10 litres per second per person for SARS-CoV-2 virus like situations, the ventilation rates mentioned in National Building Code (NBC) 2016 have been modified and the recommended Air Changes per Hour (ACH) values are provided in the report for the prevailing pandemic conditions. Maintaining a social distance of 1.5 m to 3.0 m, adopting different disinfection solutions, and purified air circulation system for good ventilation in buildings and houses are some of the major measures for decreasing viral transmission. However, it is important to note that implementing only one or two of these measures may not help in limiting the COVID-19 cases and integrating these techniques/measures can provide a feasible solution.

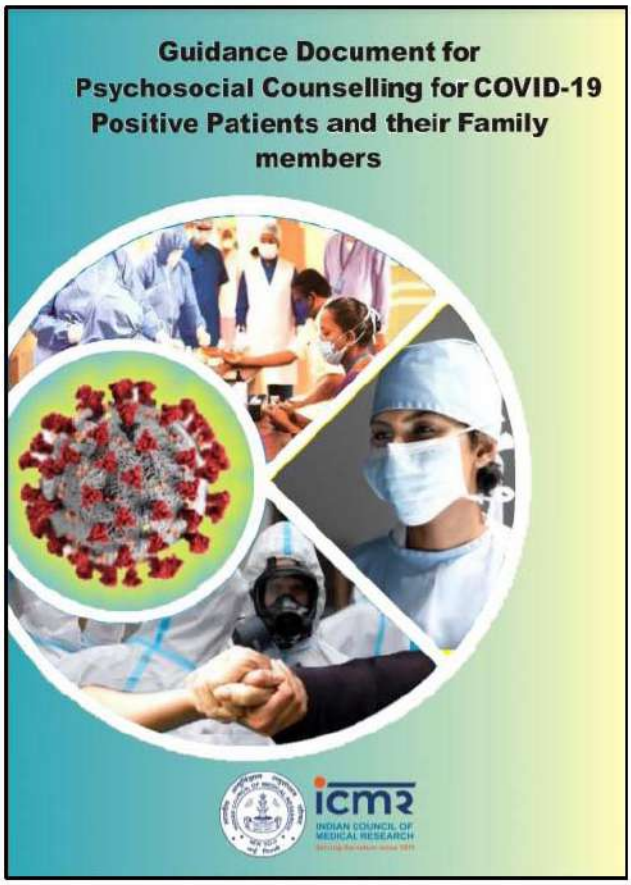
Accordingly, these guidelines have been proposed for both naturally ventilated residential and office buildings and mechanically ventilated residential and office buildings based on the scientific knowledge and engineering expertise available with CSIR. CSIR labs have also developed a variety of disinfectant solutions to ensure appropriate indoor air quality in residential and office buildings during COVID-19.



Website link:
https://www.csir.res.in/basicandlinkpage1/csir-guidelines-ventilation-residential-and-office-buildings-sars-cov-2-virus

Psychological first aid for COVID-19-positive patients and their family members released by ICMR

Indian Council of Medical Research (ICMR) has issued a guidance document for Psychosocial Counselling for COVID-19 Positive Patients and their Family Members. The objective of this manual is to guide the counsellors in understanding and addressing the mental health needs of the individuals, who are awaiting results of COVID-19 tests, confirmed COVID-19 individuals, healthcare workers working in COVID hospitals and their family members. The counsellors can aid these individuals in getting reliable information and alleviate their distress. This manual gives a framework and an algorithm about responding to people when they are distressed and supporting them during these difficult times. In addition, it has details on how the counsellor can take care of themselves during the COVID-19 pandemic.



Website Link:
https://www.icmr.gov.in/pdf/covid/techdoc/PSC_COVID_patients_v1_30042021.pdf

ICMR releases advisory for COVID-19 testing during the second wave of the pandemic

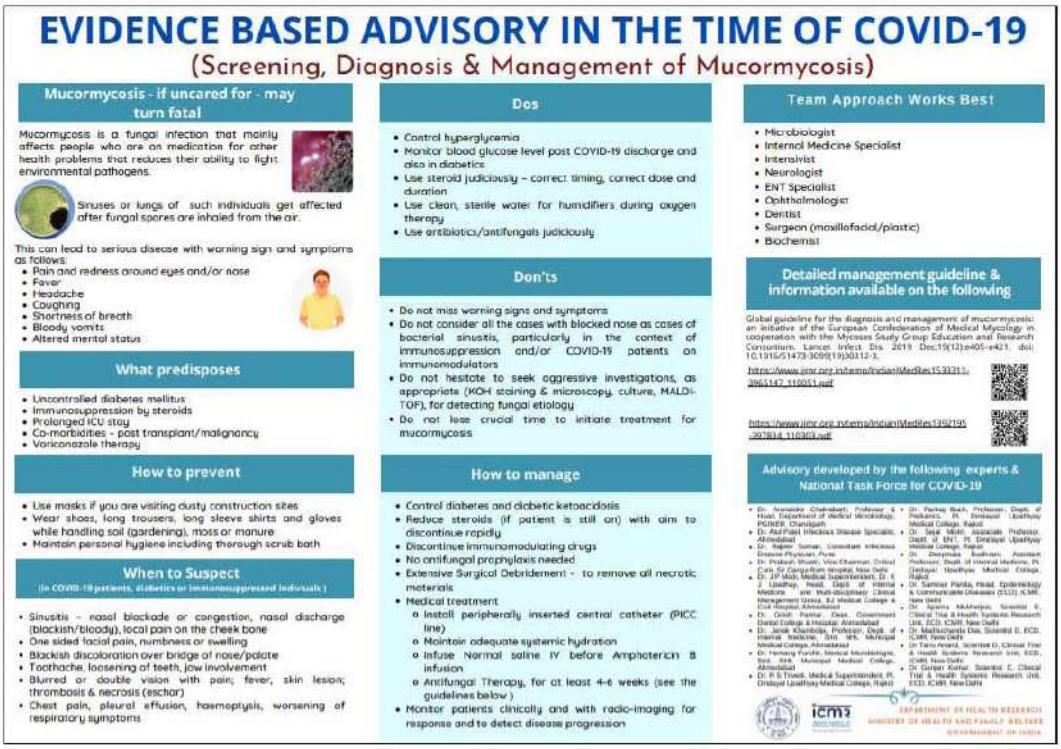
ICMR has issued an advisory for COVID-19 testing during the second wave of the pandemic due to the unprecedented upsurge of COVID-19 cases and deaths that is currently being witnessed across India. It has been observed the overall nationwide test positivity rate is above 20%. Testing-tracking-tracing, isolation, and home-based treatment of positive patients is the key measure to curb transmission of SARS-CoV-2, the causative agent of COVID-19. India has a total of 2506 molecular testing laboratories including RTPCR, TrueNat, CBNAAT, and other platforms. The total daily national testing capacity is close to 15 lakh considering a three-shift

operationalization of the existing laboratory network. At present, the laboratories are facing challenges to meet the expected testing target due to extraordinary caseload and staff getting infected with COVID-19. In view of this situation, it is considered imperative to optimize the RTPCR testing and simultaneously increase the access and availability of testing to all citizens of the country.

Website Link:
https://www.icmr.gov.in/pdf/covid/strategy/Advisory_COVID_Testing_in_Second_Wave_04052021.pdf

MoHFW releases evidence-based advisory for screening, diagnosis and management of black fungus disease

ICMR has issued an evidence-based Advisory for Screening, Diagnosis & Management of Mucormycosis (Black Fungus Disease) in poster form. The document includes warning signs and symptoms, what predisposes, how to prevent, when to suspect, dos & don'ts, how to manage, etc.



Website Link:
https://www.icmr.gov.in/pdf/covid/techdoc/Mucormycosis_ADVISORY_FROM_ICMR_In_COVID19_time.pdf

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2
COVID 2.0 FUNDING

The funding opportunities, like Calls For Proposal (CFPs), Expressions of Interest (EoIs), research grants, start-up grants, and so on, are compiled here for the usage of interested individuals, institutions, entrepreneurs, start-ups and industries, as a one-stop ready reckoner. Reference links provided for 'more information', 'how to apply' and contact information is made available wherever possible for further communication to the stakeholders.

COVID 2.0 FUNDING

NSTEDB-DST is calling promising COVID-19 start-ups to apply for NIDHI4COVID 2.0

NIDHI4COVID2.0 initiative has been specially devised as a rapid response to support start-up driven solutions, which would be helpful in tackling the current challenging, second wave of COVID 2.0 in the country. NIDHI4COVID2.0 is a special drive of National Science & Technology Entrepreneurship Development Board (NSTEDB), Department of Science & Technology, Government of India for supporting indigenous solutions and innovative products which would enable our country to fight against COVID-19 pandemic more strongly. This has been built based on NSTEDB's past experience of implementing Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH) and also through special calls through National Initiative For Developing And Harnessing Innovations - Seed Support System (NIDHI - SSS) from Technology business incubators (TBI) to support start-ups last year. In the current situation too, start-ups can play a major role in bringing new technologies and products in the market, thus making our country stronger at various fronts against the on-going war on COVID-19. Some of the start-ups already have promising technologies but need mentoring and financial and marketing support to go to the next level. Thus, DST's attempt through this new initiative is to scout and support deserving start-ups to scale up their technologies, helping them reach the product deployment stage as fast as possible.

Thrust Area to be supported: Oxygen Innovation, Portable Solution, Relevant Medical Accessories, Diagnostics, Informatics and Others

Deadline: 31st May 2021

Contact Info: nidhitbi.91@gmail.com

Website link:
https://dstnidhi4covid.in/

Joint projects under UK-INDIA COVID-19 Partnership Initiative for better understanding of COVID-19 severity in South Asian population of India and the UK

UK Research and Innovation and Department of Biotechnology and Ministry of Science and Technology have joined forces to support four collaborative bilateral research partnerships worth £5 million, aimed at providing deeper understanding on COVID-19 severity in South Asian populations located in India and the UK. Projects will be funded in partnership between DBT and UKRI's Fund for International Collaboration.

Through the UK-India COVID-19 Partnership Initiative, DBT and UKRI will support world-leading UK-India research teams. The successful projects aim to understand the pandemic through the study of related ethnic groups in different environments in both countries. These projects have the potential to deliver public health impacts in mitigating the severity of the COVID-19 in both the UK and India.

Deadline: 5th May 2022

Website link:
http://dbtindia.gov.in/latest-announcement/announcement-joint-projects-under-uk-india-covid-19-partnership-initiative
http://dbtindia.gov.in/sites/default/files/Press%20release%20on%20the%20UK-India%20C-19%20call%204May2021.pdf

SERB and TDB jointly announce special call on critical components and innovations in oxygen concentrators

Considering emerging healthcare requirements to combat the COVID-19 epidemic, SERB announces special call to catalyse R&D on critical components and innovations concerning Make-in-India oxygen concentrators.

The call seeks investigation and innovation in the development of (individual/portable) oxygen concentrators in the domains of alternate materials and mechanisms for oxygen separation; design, development, and manufacturing of critical components such as valves and oil-less compressors; design improvements for greater performance; AI-optimized oxygen flow devices and oxygen-level IoT sensors etc.

Scientist in regular service from educational and research institutes/laboratories, universities, and medical institutions, start-ups and industries can submit a proposal. The scientists from industries should align with investigators from academic/research institutions as co-investigators. Funding for industry partner(s), with respect to R&D leading to commercialization, will be forwarded to TDB, DST, for their consideration.

Deadline: 15 June 2021

Proposals should be submitted in the prescribed format through SERB online portal:
https://www.serbonline.in/SERB/HomePage

Website link:
http://serb.gov.in/pdfs/what-new/Call%20announcement-O2%20Concentrators.pdf

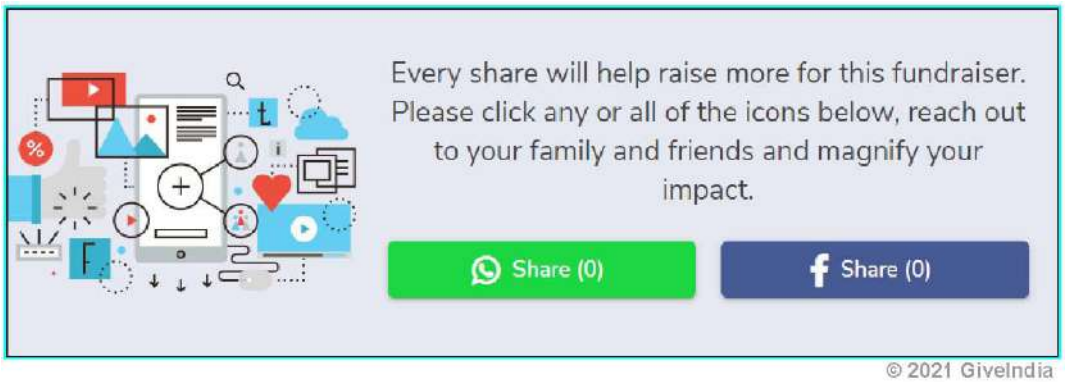
Give INDIA Fundraiser – for COVID response in India by NCBS

National Centre for Biological Sciences, Bengaluru has started a platform – give INDIA – to launch a crowd-funding campaign to ensure that the wheels of research & development keep churning for the larger good of mankind. COVID-19 relief activities are of various kinds ranging

from immediate set up of hospitals to procurement and supply of breathing aids across the country to the needy and ailing patients. However, a long-term relief would be the invention and availability of effective vaccines for every strain or mutation of the virus for everyone from a newborn to a senior citizen just like the BCG vaccine.

The critical research studies aimed at tracking vaccine-induced immune responses in real time are required to identify the vaccines which are most effective against the many variants of COVID-19, currently circulating in India and across the globe. It is crucial that these studies are continued for better protection and immunity development against such viruses in future. The time to get prepared is NOW for any similar incidents and pandemics. The constant high level studies by prominent scientists from National Center of Biological Sciences-inStem, CMC Vellore, and Pune Knowledge Cluster will ensure a better future for our children, protect our elderly, and avoid further negative economic impact.

Donations through this platform are tax exempted under 80G & 501(c).



Website Link:
https://fundraisers.giveindia.org/fundraisers/fundraiser-for-covid-19-response-in-india?ref=H92PaLUMV8

Office of PSA calls for philanthropic funding for National Consortium of OXYGEN

For details, refer to page no. 13.

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3
INDUSTRY COLLABORATIONS

The information related to contributions from industries, their timely pitching-in and joining the warfare against mitigating the COVID pandemic is provided here to sensitize the larger group of the community.

INDUSTRY COLLABORATIONS

Emergency options for medical oxygen storage and alternative mode of oxygen generation – Efforts by Tata Consulting Engineers Limited (TCE) & Interventions from Office of the Principal Scientific Adviser

The on-going second wave of the pandemic required urgent actions towards enhancing the country's oxygen generation and distribution capacity. Tata Consulting Engineers Limited (TCE) has made sincere efforts towards contributing to the requirement, focusing on agility, indigenisation aligned to Atmanirbhar Bharat, quality and cost competitiveness.

The second wave of the pandemic is more infectious, causing an increase in oxygen demand for critically ill patients. An extreme urgency was felt to boost up alternative ways of localised medical oxygen generation and bottling. Office of the Principal Scientific Adviser has coordinated these efforts for a broader ecosystem to be aware and leverage these concepts and solutions to mitigate the oxygen crisis, with a sincere aim to benefit various MSME, states, and other central agencies.

The significant efforts taken towards meeting the demand and bridging the supply gap are as follows:

- Conversion of cylinders such as CO_2, CNG, LPG, etc., with suitable precautions, colour-coding and planning for gaseous oxygen distribution across the country leveraging the existing LPG bottling and distribution network and using modular COVID units. The concept is under consideration with Petroleum and Explosives Safety Organization (PESO). This is over and above the approvals granted by PESO already related to the conversions of Nitrogen, Inert gas cylinders and LNG tankers for LOX.
- Conversion of Pressure Swing Adsorption (PSA) Nitrogen plant to PSA Oxygen plants: The idea behind the conversion was to leverage existing available infrastructure. This concept was piloted with IIT Bombay and was worked with CPCB & CSIR for rollout and scaling up.
- Rollout of an open-source oxygen concentrator design for use by start-ups, entrepreneurs and MSME across India for oxygen generation by using such concentrators.
- In-house efforts leveraging open-source design were accomplished in five working days, with almost all local parts, with benchmark results of up to 20 LPM with 90-94% oxygen concentration.

Here is the brief report on efforts taken up by Tata Consulting Engineers Limited (TCE) to meet the demand and enabling last-mile oxygen distribution and supply chain logistics.

Contact Info: tceconnect@tce.co.in, secy@psa.gov.in

Website Links & References:

White Paper:
https://www.tce.co.in/wp-content/uploads/2021/04/Meeting-Oxygen-Demand-Tata-Consulting-Engineers-Response.pdf

Cylinder Conversion:
https://www.tce.co.in/wp-content/uploads/2021/05/Cylinder-Conversion-For-Oxygen.pdf

PSA Nitrogen Plant conversion:
https://www.tce.co.in/wp-content/uploads/2021/05/Emergency-Oxygen-IIT-Bombay-TCE-Spantech-v1.pdf

Portable Oxygen Concentrator:
https://www.tce.co.in/wp-content/uploads/2021/05/O2-Concentrator.pdf

Office of PSA calls for philanthropic funding for National Consortium of OXYGEN

Office of the Principal Scientific Adviser, Government of India calls for private sector companies, donor organizations and individuals to join India's fight against COVID-19 by providing philanthropic funding to support the National Consortium of OXYGEN (O_2 TO INDIA). The consortium is looking forward to providing immediate to short-term relief and working on building the manufacturing ecosystem and healthcare infrastructure for the long run.

These funds may be used for producing medical oxygen for various health facilities in India, including Army hospitals, Government hospitals and Charity hospitals through an initiative called 'Project O_2'. Medical oxygen is on high priority, so while companies are airlifting few supplies, we should be prepared for the pandemic that is expected to last for the next several years and 3rd and 4th waves are expected in the coming months. This needs immediate and short term ramp-up of our logistics as well as production capacities. This entails manufacturing raw material currently being imported from China and other places; some are delayed, and costs are unaffordable. There is a need to support the fast-paced evaluation of quality manufacturers, scale up their capacity, address logistics challenges, enable supplies to extended/make-shift hospitals, and strengthen R&D and innovation for future pandemics.

To execute this project, Office of the PSA is facilitating at the national level supply of critical raw materials such as zeolites, setting up small oxygen plants, manufacturing compressors and final products, quality oxygen cylinders, concentrators and ventilators. The manufacturing and supply consortium includes Bharat Electronics Limited (BEL), Electronic Corporation of India Limited (ECIL), Skanray Technologies, IIT Kanpur, C-CAMP Bengaluru, IIT Delhi, Venture Center Pune, IIT Bombay, IIT Hyderabad, IISER Bhopal and 40+ MSMEs.

A committee of key experts has been evaluating from a pool of Indian manufacturers, start-ups and MSMEs (in partnership with FICCI, MESA, etc.) producing medical oxygen and other critical equipment such as oxygen concentrators, ventilators and oxygen cylinders. A robust evaluation committee with both subject matter experts from IITs and manufacturing companies has been set up and it will be continuously evaluating the oxygen manufacturing companies on an on-going basis and adding to the consortium. Quality cannot be compromised, and hence this system has been put in place.

Simultaneously, a TCS logistics and inventory management portal has been provided pro bono to the office of the PSA for managing quality covid relief will be used.

Anyone could support the initiative by funding:

1) Research on variants and calibration of vaccines based on variants identified and
2) Start-ups, BEL, ECIL, MSMEs, Start-ups setting up and manufacturing oxygen equipment, extension hospitals by placing advance orders directly.

Office of the PSA aims to facilitate providing proposals approved by an expert committee and/ or one can also fund the PSUs directly as they have 45 MSMEs under their supply chain.

Please write back for any clarification:

Project Lead: Mr Vibhor Bansal, Vibhor.bansal@investindia.org.in

Project Lead CSR/Philanthropy: Mr Bhanu Prabhakar, bhanu.prabhakar@investindia.org.in

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CAPACITY ENHANCEMENT OF MEDICAL OXYGEN

The impact of the second wave of COVID pandemic has seen a shortage of medical oxygen across the nation. This section contains the compiled information related to efforts and contributions by various agencies, industries, and so on.

CAPACITY ENHANCEMENT OF MEDICAL OXYGEN

Oxygen Recycling System designed by Indian Navy to mitigate current oxygen crisis

Amidst the second wave of COVID-19, the Diving School of the Southern Naval Command of the Indian Navy has conceptualised and designed an 'Oxygen Recycling System' (ORS) to alleviate the existing oxygen (O_2) shortages. The Diving School has expertise in this area as the basic concept is used in some of the diving sets used by the school.

The ORS is designed to extend the life of the existing medical O_2 cylinders two to four times, using the fact that only a small percentage of O_2 inhaled by a patient is actually absorbed by the lungs, the rest being exhaled into the atmosphere along with carbon-dioxide (CO_2) produced by the body. This exhaled O_2 can be re-used, provided the exhaled CO_2 is removed. To achieve this, the ORS adds a second pipe to the patient's existing O_2 mask, which sucks out the air exhaled by a patient using a low-pressure motor. Both the mask inlet pipe (for O_2) and the mask outlet pipe (for exhaled air) are fitted with non-return valves to maintain a positive pressure and unidirectional flow of gases at all times to ensure the patient's safety against dilution hypoxia. The exhaled gases, mainly CO_2 and O_2, are then fed into a Bacterial Viral Filter and Heat and Moisture Exchanger Filter (BVF-HME filter) to absorb any viral contaminants. After viral filtration, the gases pass through a high-grade CO_2 scrubber with a High Efficiency Particulate Air (HEPA) filter, which absorbs CO_2 and other particulates, allowing enriched O_2 to pass through unaffected. The enriched O_2 from the scrubber is then pumped back into the inhalation pipe of the patient's face mask, thereby increasing the flow rate of O_2 to the patient and reducing the use of O_2 from the cylinder.

The air flow in the ORS is maintained by a medical-grade pump fitted ahead of the CO_2 scrubber, which ensures a positive flow, facilitating comfortable breathing by the patient. Digital flow meters monitor the flow rate of O_2, and the ORS also incorporates inline O_2 and CO_2 sensors with automatic cut-offs, which stop the ORS in case O_2 levels drop below the normal limits, or the CO_2 percentage exceeds normal limits. However, this cut-off does not affect the normal in-flow of O_2 from the cylinder, thereby allowing the patient to continue breathing easily, even if the ORS stops due to the cut-offs or for any other reason.

The first fully operational prototype of the ORS was produced on 22 April 2021 and underwent a series of in-house trials and design improvements at the Southern Naval Command, with third-party observers from ISO certified firms. Thereafter, on the directives of NITI Aayog, the system underwent detailed analysis and assessment by a team of specialists at Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) at Thiruvananthapuram. The team of specialists at SCTIMST found the concept and design of the Oxygen Recycling System feasible and also suggested a few additional modifications. An 'Initial Evaluation Certificate' was accorded to the ORS on 18 May 2021 by the Director, SCTIMST. The system is now being progressed for clinical trials in accordance with existing guidelines, which are expected to be

completed expeditiously, after which the design will be freely available for mass production in the country. All components used in the ORS are indigenous and freely available in the country.

The overall cost of the ORS prototype has been capped at Rs. 10,000 against an envisaged saving of Rs. 3,000 per day due to the recycling of O_2. Besides substantially enhancing the existing O_2 capacity in the country, the ORS can also be used to extend the life of O_2 cylinders used by mountaineers/soldiers at high altitude, for HADR operations and on-board naval ships and submarines.

The ORS has been designed by Lieutenant Commander Mayank Sharma of Diving School. The system's design has been patented, and an application to this effect has been filed by the Indian Navy on 13 May 2021.

Website link:
https://pib.gov.in/PressReleseDetailm.aspx?PRID=1720007

PM-CARES Fund to procure 1,50,000 units of Oxycare System developed by DRDO to regulate oxygen

PM-CARES Fund has accorded sanction for procurement of 1,50,000 units of Oxycare System at a cost of Rs. 322.5 Crore. It is a comprehensive system developed by DRDO to regulate oxygen being administrated to patients based on the sensed values of their SpO_2 levels.

The system has been developed in two configurations. The basic version consists of a 10-litre oxygen cylinder, a Pressure Regulator cum Flow Controller, a Humidifier and a Nasal Cannula. The oxygen flow is regulated manually based on the SpO_2 readings. The intelligent configuration includes a system for automatic regulation of oxygen through a Low Pressure Regulator, Electronic Control System and an SpO_2 Probe in addition to the basic version.

SpO_2-based Oxygen Control System optimises consumption of oxygen based on the SpO_2 level of the patient and effectively increases the endurance of the portable oxygen cylinder. The threshold SpO_2 value for initiating flow from the system can be adjusted by the health staff and the SpO_2 levels are continuously monitored and displayed by the system. It reduces the work load and exposure of healthcare providers by eliminating the need of routine measurement and manual adjustments of oxygen flow, thereby facilitating tele-consultation also. The automatic system also provides suitable audio warning for various failure scenarios including low SpO_2

values and probe disconnections. These Oxycare systems can be used at homes, quarantine centres, COVID Care Centres and hospitals.

In addition, Non-Rebreather Masks (NRM) are integrated with the Oxycare Systems for efficient use of oxygen which results in saving of oxygen by 30-40%.

DRDO has transferred the technology to multiple industries in India who will be producing it for use all across India.

The current medical protocol recommends oxygen therapy for all severe and critical COVID-19 patients. Given the current status of oxygen generation, transport and storage, oxygen cylinders have proved to be effective. Considering the present COVID pandemic situation with large number of individuals requiring oxygen therapy, sourcing only one type of system may not be practical, as all the manufacturing plants making the basic building blocks of the system are already running at their maximum capacity. A mix and match of the system would prove to be a useful arrangement in the given situation. While the capacity of existing domestic manufacturers of carbon-manganese steel cylinders is very limited, as an alternative, DRDO has suggested light material portable cylinders which can easily act as substitutes for normal oxygen cylinders.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718054

IISER-Bhopal makes oxygen concentrator 'oxycon' to meet rising demand of COVID patients

Indian Institute of Science Education and Research (IISER) in Bhopal has developed an affordable oxygen concentrator 'oxycon' to meet the rising demand of medical oxygen amid a second wave of the coronavirus pandemic. The device, which is estimated to cost around Rs. 17,000, can provide 93-95 per cent pure oxygen with a flow rate of up to 3 litres per minute. According to the team, the device, which costs more than Rs. 50,000 at present, has been developed as a solution to tackle the oxygen shortage amid the second wave of the COVID-19 pandemic. It has been developed using the open-source technology and material. The developed device is portable, customizable, and easy to deploy, even at village-level.

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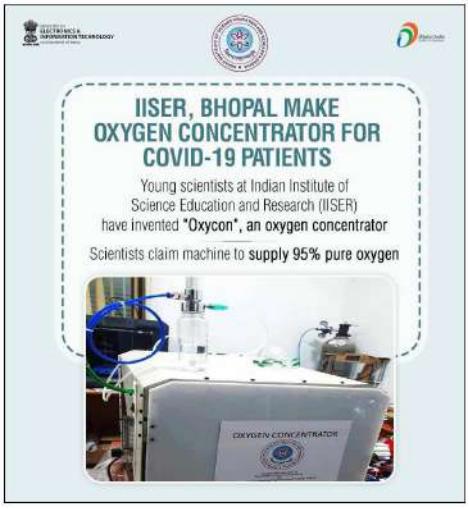

Indian Navy develops oxygen plant on wheels

Mobile oxygen generation plants, termed 'Oxygen on Wheels' designed and developed by Naval Dockyard Visakhapatnam under the Eastern Naval Command (ENC) were inaugurated by Vice Adm AB Singh, Flag Officer Commanding-in-Chief ENC on 20 May 2021. The Naval Dockyard Technical team conceived and developed two oxygen generation plants each with 100 litres per minute capacity, designed to provide a direct feed to any hospital's pipeline system.

The oxygen plants, mounted on trailers, can easily be transported to remote hospitals and connected to the hospital's fixed oxygen piping system to serve as the main feed for up to 16 beds. The oxygen system can also serve as a backup to prevent incidents of low oxygen pressure in the hospitals. Such a system has been conceived and implemented to support the State Govt. efforts during the on-going oxygen crises, especially in smaller hospitals and rural areas that may not have the requisite infrastructure.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1720495

Oxyheal Pvt Ltd, Tamil Nadu develops oxygen concentrators, manufacturing to be scaled up

Oxyheal Pvt Ltd, incubated at Kongu Engineering College, Tamil Nadu, has developed oxygen concentrators that use Hyperbaric Oxygen Therapy to treat chronic wounds, which are wounds that do not heal over a long period of time.

The device is portable and significantly easier to use and cheaper for the end-user in comparison to presently existing technologies. It can be used to treat COVID-19 patients whose oxygen level drop below 95%.

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Website link:
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19
http://oxyheal.co.in/index.html

Oil and Gas Public Sector companies setting up 100 PSA Medical Oxygen Generation Plants in hospitals

Oil and Gas Public Sector Companies, under the administrative control of the Ministry of Petroleum and Natural Gas, Government of India are working earnestly to meet the nation's Liquid Medical Oxygen requirements, in this hour of need. Under the guidance of the Minister

of Petroleum and Natural Gas Shri Dharmendra Pradhan, they are setting up about 100 Pressure Swing Adsorption (PSA) Medical Oxygen Generation Plants in public health facilities across the country. The hospitals in Uttar Pradesh, Bihar, Karnataka, Goa, Kerala, Maharashtra, Gujarat, Rajasthan, Odisha, Madhya Pradesh and Delhi will be covered under the initiative. The entire expenditure for these plants will be borne by the companies from their CSR fund.

These PSA plants will come in varying capacities to generate oxygen, catering to hospitals with 200 to 500 beds. They employ technology provided by DRDO and CSIR, absorbing nitrogen from ambient air to concentrate oxygen. The oxygen thus generated will be supplied straight to patients admitted in the hospital. Orders have been placed with the Indian vendors for these plants, and these will start becoming operational from this month itself, and by July, all such plants will come up.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1716530

Steel plants supply 4076 MT Liquid Medical Oxygen

Steel companies from across the country, from both the public and private sectors, have stepped up efforts to meet the nation's requirement of medical oxygen. On 4 May, the Total Liquid Medical Oxygen (LMO) production by the steel plants was 3680.30 MT, and Total LMO Supply was 4076.65 MT. In comparison, the LMO supply was 3131.84 MT to various states on the 25 April 2021. In mid-April, on an average 1500-1700 MT/day of LMO was being dispatched.

Steel Authority of India, one of the largest domestic steel producers, has been enhancing its capabilities to supply LMO in the country. The daily delivery of LMO from its integrated steel plants situated at Bhilai (Chhattisgarh), Rourkela (Odisha), Bokaro (Jharkhand), and Durgapur and Burnpur (West Bengal) has been increased from a level of about 500 MT in the 2nd week of April to more than 1100 MT per day currently. The company has so far supplied over 50,000 MT of LMO. In April, 2021, SAIL delivered more than 17500 MT LMO to 15 states across the country including the states in which the plants are located.

Fourteen "Oxygen Express" trains carrying more than 950 MT LMO have been loaded by 4 May for various parts of the county from SAIL plants at Bokaro, Rourkela and Durgapur. SAIL plants have also received tankers, which have been airlifted and after loading have moved to their destinations by road and rail. The Railways, Air Force, steel plants and oxygen plants are coordinating the efforts of transporting the tankers.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1716301

Efforts initiated for production of medical oxygen from modified industrial nitrogen plants

Considering the COVID-19 pandemic situation and to further augment availability of oxygen for medical purposes in the country, the Central Government had asked Central Pollution Control Board (CPCB), which has comprehensive database of industrial units, to identify the industries having spare nitrogen plants and explore the feasibility of converting existing nitrogen plants to produce oxygen. CPCB with the help of State Pollution Control Boards (SPCBs) have identified such potential industries, wherein existing nitrogen generation plants may be spared for production of oxygen. Consultation have been held with potential industrial units and experts.

About 30 industries have been identified, and efforts have begun to modify nitrogen plants for the production of medical oxygen. Some of these plants can be shifted to nearby hospitals for supplying oxygen and some plants, where it is not feasible to shift the plants, can produce oxygen on-site.

M/s UPL Ltd converted one 50 Nm3/hour capacity nitrogen plant to produce oxygen using Zeolite Molecular Sieve (ZMS) and installed it at L G Rotary Hospital, Vapi (Gujarat). This plant is producing 0.5 ton/day oxygen and is operational since 27 April. UPL Ltd. is also under process of conversion of three more plants. On conversion to oxygen plants, these plants will be installed at hospitals in Surat and Ankaleshwar.

In the existing nitrogen plants, replacing Carbon Molecular Sieve (CMS) with ZMS and few other changes such as installation of oxygen analyzer, change in control panel system, flow valves etc., oxygen for medical use can be produced. With the availability of ZMS, such modified plant can be set-up in 4-5 days while installation of new oxygen plant may take minimum 3-4 weeks.

Oxygen produced in on-site plants has to be compressed and filled in cylinders/special vessels using high pressure compressor for transporting to hospitals. Facilitation is being provided to these industries for completion of work at the earliest.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1715313

Simplification of procedure for import of oxygen cylinders and cryogenic tankers/containers

The Government of India has reviewed the existing procedure of registration and approval of global manufacturers for importing oxygen cylinders and cryogenic tankers/containers by Petroleum and Explosive Safety Organization (PESO). In view of the COVID-19 pandemic, PESO shall not carry out physical inspection of global manufacturers' production facilities before grant of such registration and approval. Now, such approvals shall be granted online without any delay on submission of manufacturer's particulars; ISO certificate of manufacturer; List of Cylinders/Tankers/Containers, their specifications, drawings & batch number; Hydro test certificate and Third party inspection Certificate.

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Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1716302

Five hundred Medical Oxygen Plants to be set up across the country within three months

In order to tackle the surge in COVID-19 cases and subsequent requirement of oxygen, PM-CARES has allocated funds for the installation of 500 Medical Oxygen Plants across the country. These plants are planned to be set up within three months. Defence Research and Development Organisation (DRDO) setup five Medical Oxygen Plants within the first week of May in and around Delhi. These are to be installed at AIIMS Trauma Centre, Dr Ram Manohar Lohia Hospital (RML), Safdarjung Hospital, Lady Hardinge Medical College and one at AIIMS, Jhajjar, Haryana. These have been supplied by M/s Trident Pneumatics Pvt. Ltd., Coimbatore which is the technology partner of DRDO and has been given an order of 48 plants. Order of 332 plants has been placed with M/s Tata Advanced Systems Limited and the delivery will start from mid-May. The delivery schedule is being monitored very closely to deliver before the scheduled time. Sites are being prepared at each hospital in parallel.

These Medical Oxygen Plants are designed for a flow rate of 1,000 litres per minute (LPM). The system can cater to 190 patients at a flow rate of 5 LPM and charge 195 cylinders per day. The Medical Oxygen Plant technology has been developed by DRDO based on the On-Board Oxygen Generation for LCA, Tejas. These plants will overcome the logistics issues of oxygen transportation and help the COVID-19 patients in emergency.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1715960

ACT Grants, Swasth Alliance, and Feeding India donating 50,000 oxygen concentrators nationally, MyGov coordinating with various stakeholders

India, in the middle of the second wave of COVID-19, needs to rapidly augment oxygen supply to hospitals. In order to save as many lives as possible, ACT Grants (a not-for-profit movement created by the VC and start-up community in India), Swasth Alliance (a not-for-profit alliance of over 150 healthcare organisations), and Feeding India (a not-for-profit run by Zomato) are working towards the goal of sourcing and distributing 50,000 oxygen concentrators. These oxygen concentrators will be donated across India free of cost, largely to various public health institutions and NGOs working for public health. Delhivery (logistics partner), Amazon (Logistics partner), Temasek Foundation (Sourcing and Funding partner), Paytm (Sourcing partner), and several others from the ecosystem are supporting this effort. MyGov is supporting the initiative by ensuring proper coordination with various stakeholders involved, in particular the District Collectors for most optimal utilization of the oxygen concentrators.

A joint committee has been formed in the spirit of public-private partnership to oversee the distribution process and ensure equitable and transparent allocation. Given that demand for oxygen concentrators currently outstrips supply, an allocation methodology has been developed leveraging publicly available COVID-19 data. This methodology is further refined using predictive analytics generated by the Aarogya Setu ITIHAS interface (Developed by IIT Madras) for emerging hotspots.

The methodology is published on MyGov (mygov.in), Swasth (swasth.app), and ACT websites. The district-level distribution of oxygen concentrators will also be made available on https://self4society.mygov.in/ and https://www.swasth.app/oc-deployment.

Demand for oxygen concentrators from the frontline is being collected through a form hosted by the Swasth Alliance for all (https://www.swasth.app/covid19) and on MyGov.in for District Collectors (https://self4society.mygov.in/collector). Various district magistrates, state governments and not-for-profit healthcare providers are required to fill in their requirements of oxygen concentrators in this form.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1716912

S^3 medical oxygen generator developed by team IISc to combat COVID-19 pandemic

The Gasification Group at IISc, which specializes in low pressure multi-species gas separation, has developed an oxygen generation system for small-scale medical requirements. The process uses low power and meets the specifications as per the MoHFW.

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

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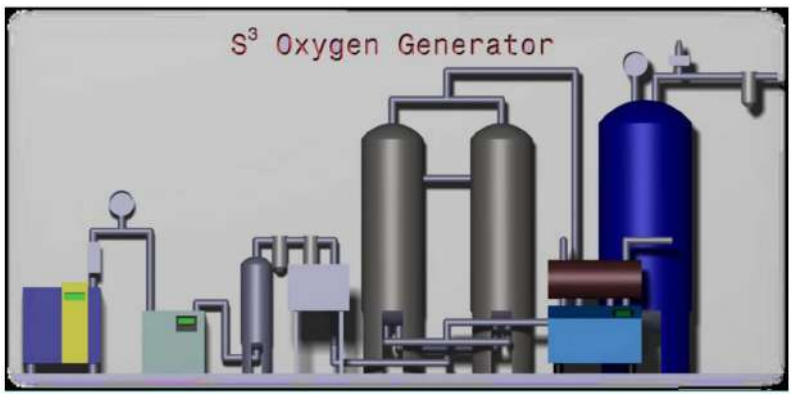

Website link:
https://covid19.iisc.ac.in/s3-medical-oxygen-generator/

CSIR-CMERI Oxygen Enrichment Unit – An optimised oxygen administering device amidst the nationwide oxygen shortage

The entire nation is undergoing an unprecedented pandemic situation of COVID-19. Oxygen therapy is recommended for severe illness caused by the Coronavirus. There is a massive short supply of medical-grade oxygen across the country. To meet the oxygen demand and minimize the supply chain problem of transportation and storage risks related to oxygen cylinders, CSIR- Central Mechanical Engineering Research Institute (CMERI) has developed 'Oxygen Enrichment' technology which has been transferred virtually to M/s. Apollo Computing Laboratories (P) Ltd, Kushaiguda, Hyderabad.

The unit requires easily available oil-free reciprocating compressor, oxygen-grade zeolite sieves and pneumatic components. It is capable of delivering medical air in the range of up to 15 LPM with oxygen purity of more than 90%. If required, this unit can even deliver up to 70 LPM at a purity of around 30% and can safely be placed in the isolation ward of the hospital for patients who are in dire need of oxygen. This will help the accessibility of oxygen in remotest places and widest points of need. The Outreach Factor of Oxygen will be multiplied through the adoption of this in-situ and decentralised generation of oxygen.

Mr Jaipal Reddy of M/s Apollo Computing Laboratories during the event of transfer of technology stated that the first prototype would be developed within 10 days and the production would be started from the second week of May. They have presently the manufacturing capacity of 300 units per day which may be augmented on demand. He also informed that their company is planning to develop the unit both as standalone Oxygen Enrichment Unit as well as with integrated version with 'Swasth Vayu' technology of CSIR-NAL. Mr Reddy stressed that the unit is essentially required particularly as 'Mini ICUs' at small hospitals and isolation centres and at remote villages and places. By use of Oxygen Concentrators, the optimum utilization of oxygen to the needy patients may also be ensured. If this facility is provided to COVID-19 patients at initial stage, their visits to hospitals and further ventilatory support may be avoided in most of the cases. It was also felt that the use of such units is safe and easier considering the recent risk factors involved with the Oxygen Cylinders. Mr Reddy appreciated the suggestion of Prof. Harish Hirani to conduct an awareness and training programme for use of the OEU through social media for proper guidance and its effective use by all concerned in association with CSIR-CMERI.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713400

West Bengal and Haryana MSMEs pitch in with Oxygen Enrichment Technology

In its efforts to empower and strengthen the MSMEs further, CSIR-CMERI transferred its indigenously developed technology of Oxygen Enrichment Unit (OEU) to three entrepreneurs, namely M/s Conquerent Control Systems Private Limited, IMT Manesar, Gurgaon; M/s A B Elasto Products Private Limited, Krishnapur, Kolkata; and M/s Automation Engineers, P.S. Hare Street, Kolkata virtually on 21 May 2021.

During the occasion, Prof. (Dr) Harish Hirani said that usage of Oxygen Enrichment technology varies greatly from ICU in hospitals, isolation wards, to extended care at home. The supplemental oxygen is required in ailing patients for effective metabolism. He further added that this is often misunderstood that SpO_2 (Oxygen saturation of blood) above 90 can only be achieved in the ailing patients with Oxygen percentage (FiO_2) more than 90. Many times a moderate amount of

supplemental oxygen FiO_2 in the range of 0.3 to 0.4 with appropriate flow rate (under medical supervision) may provide SpO_2 level above 90. He also stressed upon the need for use of proper masks by the patients to avoid spreading of infections amongst their family members. Prof. Hirani further said that the motto of the Institute is to share the technology to the entrepreneurs who have the manufacturing capabilities and capacity to source the required raw materials of the product so that the mass production of the OEU may be started at the earliest for its reach to the common people. This will also boost the skill development and employability of a large number of beneficiaries. He also assured the licensees for handholding and guidance in sourcing of the raw materials, technical detailing, or any other related support from the Institute for manufacturing the OEUs.

Mr. Dev P. Goel, MD and Mr. Bharat Goel, CEO of M/s Conquerent Control Systems Private Limited said that their company has all the manufacturing capability related to fabrication, finance, and resources to start the production of the OEU immediately. They further stated that their primary motto at the moment is service to the humanity considering the prospective third wave and would try to keep the price of the product to the minimum. They have also planned for providing the product to the hospitals, clinics, schools and colleges, factories for workers, and the housing societies for maximizing the benefits of the technology. They were also concerned over the influx of spurious products from abroad lacking the trust of the people, but were very hopeful that with CSIR-CMERI's technology and their brand value an indigenous and candid product would be available to the masses.

Mr. Sushim Mukul Bhol, Director, M/s A B Elasto Products Private Limited shared the profile of his company which is basically involved in the rubber-based auto engineering products like Air Brakes, Hose etc. The company has excellent infrastructural facility and distribution system to start manufacturing the OEUs. Mr. Bhol said that within a month's time he would make the prototype and would initially start with 10 numbers of OEUs per day which would be scaled up as per the requirement. He said that compressor is not a problem for them and they would get some zeolite from the local sources.

Mr. Gouranga Mitra, Proprietor, M/s Automation Engineers stated that his company is presently engaged in making engineering tools which are exported to different countries. Now he is diversifying his product line to the medical equipment also as his company has all the infrastructural facilities for manufacturing the OEUs. They would also manufacture zeolite sieves and make the prototype within 15 days and planning to start production of 500 units per month initially. Mr. Mitra also hoped that with the add-on features and support from CSIR-CMERI on the technology, they would be able to export the product from the country very shortly.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1720740

Guideline for oxygen self-use during homecare by PGIMER-Chandigarh & Panjab University

For details, refer to page no 79.

Office of PSA calls for philanthropic funding for National Consortium of OXYGEN

For details, refer to page no. 13.

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EFFORTS IMPACTING COVID MITIGATION

The efforts made by various agencies, apex bodies, domain institutions, and so on towards meeting the requirements posed due to the pandemic are compiled here for the consumption and benefits of the general public.

EFFORTS IMPACTING COVID MITIGATION

Anti COVID-19 drug 2-DG developed by DRDO

Minister of Defence, Shri Rajnath Singh and Minister for Health and Family Welfare, Dr Harsh Vardhan jointly launched the new COVID-19 drug 2-DG at DRDO Bhawan. The anti-COVID-19 therapeutic application of the drug 2-deoxy-D-glucose (2-DG) has been developed by Institute of Nuclear Medicine and Allied Sciences (INMAS), a lab of Defence Research and Development Organisation (DRDO), along with Dr Reddy's Laboratories (DRL), Hyderabad.

Speaking at the launch Dr Harsh Vardhan remarked that today is a historic day in our fight against COVID-19 and congratulated the scientific community and DRDO for their patience and perseverance for developing first indigenous medicine. He said that the drug has the potential to become a game changer in our response against the pandemic as it reduces the dependence of patients on oxygen administration and has the potential of getting absorbed differentially and in a selected manner. In the COVID-infected cells, it inhibits virus synthesis and energy production for the process.

Dr Harsh Vardhan further stated that around thirty hospitals were involved in the clinical trials of this drug. He said that the drug will go to the selective cells and prevent synthesis of virus and reduce recovery time.

Expressing his gratitude towards the Defence Minister, Dr Harsh Vardhan said that due to the efforts of the Defence Ministry and DRDO, several PSA plants have been successfully installed in Delhi and across the country.

Dr Harsh Vardhan also cautioned against complacency and said that we will win over the war against COVID-19 by collective efforts and by following COVID-appropriate behaviour.

Secretary, Department of Defence R&D and Chairman, DRDO Dr G Satheesh Reddy expressed confidence that the anti-COVID drug will help the patients recover from the deadly virus, hoping that DRL, Hyderabad will take it forward and soon make the drug available for the patients.

Joining the event virtually, Chairman, DRL, Shri Kallam Satish Reddy said, "Dr. Reddy's is glad to have partnered with DRDO and INMAS in the development of 2-DG. This is a re-affirmation of our company's efforts to address COVID through a host of therapeutics and vaccine."

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1719393

DST-supported ventilation system to bring relief to health workers sweating in PPE suits for long hours

Health workers may soon be relieved of sweating out long hours in heavy suffocating PPE kits to meet their busy duty schedules. A compact, economical ventilation system for PPE

kits developed by a Pune-based start-up can prevent excessive sweating while wearing such kits.

The ventilation system, when attached with the conventional PPE kits with one simple modification, keeps the health workers well ventilated preventing not only bodily discomforts but also possible fungal diseases in the body.

Nihaal Singh Adarsh, an engineering student from Mumbai along with his start-up called Watt Technovations developed the technology called 'Cov-Tech Ventilation System', at RIIDL (Research Innovation Incubation Design Laboratory) supported by the National Science & Technology Entrepreneurship Development Board (NSTEDB), Department of Science & Technology, Government of India, in Somaiya Vidyavihar University.

Adarsh, a student of K J Somaiya College of Engineering and the founder of Watt Technovations, received NIDHI's PRomoting and Accelerating Young and ASpiring technology entrepreneurs (PRAYAS) grant of Rs. 10,00,000 from Department of Science and Technology, Government of India for prototype development and product innovation. The start-up also received Rs. 5,00,000 as support from new venture investment programme jointly conducted by RIIDL and K J Somaiya Institute of Management.

The 'Cov-Tech Ventilation System' can be fastened over the waist just like a simple belt over which the traditional PPE is worn and can provide comfort to the doctors and medical practitioners working in the hospitals to treat COVID-infected patients. The design of the ventilation system ensures a complete air seal from the PPE kit. It provides a breeze of fresh air to the user in a gap of just 100 seconds.

The product developed at a state-of-the-art prototyping facility at Dassault Systèmes in Pune was finalised as per the medical experts' advice.

"A team of mentors and experts from RIIDL supported the start-up and helped them at every stage providing a conducive environment to help the innovator give the best output," said Gaurang Shetty, Chief Innovation Catalyst at RIIDL.

The result was a compact, portable, and user-friendly device to provide a ventilation system for PPE suits. The Covtech Ventilation system is being used in Sai Sneh Hospital, Pune and Lotus Multi- Specialty Hospital, Pune and the company plans to scale up the uses by May/June.

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Cov-Tech Ventilation system being used at Sai Sneh Hospital

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1719353
https://www.watttechnovations.com/

Ex-Defence doctors providing online consultation on e-Sanjeevani OPD

Ex-Defence doctors will now provide online consultation on e-Sanjeevani OPD to all citizens of the country. Veterans have come forward to answer the call of the nation and offered their services to help the people needing medical care. Defence Secretary Dr Ajay Kumar and Director General of Armed Forces Medical Services (AFMS) Surgeon Vice Admiral Rajat Datta addressed the veterans who have come forward to offer their services, through video conferencing on May 7, 2021. This service can be availed by any civilian on the website https://esanjeevaniopd.in/.

The e-Sanjeevani OPD is a flagship telemedicine platform of the Government, developed by the Centre for Development of Advance Computing (C-DAC), Mohali under the aegis of Ministry of Health and Family Welfare (MoHFW). It provides free consultations to Indian citizens and is functioning extremely well. However, due to the surge in COVID-19 cases, the demand for doctors is up while the supply has reduced as doctors are being pulled out for COVID ward duties. This is where the defence veterans are stepping in to help.

The Medical Branch of HQ Integrated Defence Staff (IDS) is providing telemedicine service for the serving and retired defence personnel and has coordinated with MoHFW and NIC to roll out this Ex-Defence OPD for civilian patients. Deputy Chief IDS (Medical) Lt Gen Madhuri Kanitkar has urged the fraternity of retired AFMS doctors to join this platform and provide valuable consultation to the citizens when the country is going through a difficult time.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1716822
https://esanjeevaniopd.in/

Children impacted by COVID-19 pandemic provided tele-counselling through SAMVEDNA

With an objective of providing psychological first-aid and emotional support to children affected during COVID-19 pandemic, National Commission for Protection of Child Rights (NCPCR) is providing tele-counselling to children through SAMVEDNA (Sensitizing Action on Mental Health Vulnerability through Emotional Development and Necessary Acceptance) - a toll-free helpline launched to provide psycho-social mental support to children affected during COVID-19 pandemic. Tele-counselling is being provided through a network of qualified Experts/Counsellors/Psychologists trained under the guidance of Dr Shekhar Seshadri, Professor, Department of Child and Adolescent Psychiatry and his team from NIMHANS, on various psychosocial issues in reference to COVID-19, using different tele-counselling strategies.

SAMVEDNA is for psychological support to children to address their stress, anxiety, fear and other issues during the pandemic. This service is available on a toll-free No: 1800-121-2830 from Monday to Saturday from 10 a.m. to 1 p.m. and 3 p.m. to 8 p.m. This service is exclusively for children who are willing to talk and are in need of counselling. When a child/caretaker/parent dials SAMVEDNA1800-121-2830, they get to speak to a professional counsellor in a safe environment. Tele counselling is provided to the children under three categories:

1. Children who are in Quarantine/isolation/COVID Care centres.
2. Children who have COVID-positive parents or family members and near ones.
3. Children who have lost their parents due to COVID-19 pandemic.

This toll-free tele-counselling cater to the children from all over India in various regional languages like Tamil, Telugu, Kannada, Oriya, Marathi, Gujarati, Bengali etc. This service was launched in September, 2020 and continuing to support children in the difficult times of COVID-19 pandemic.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1719426

SCTIMST develops new multiplex RT-PCR kit with novel gene targets to facilitate detection across various mutant strains of COVID-19

A newly developed multiplex RT-PCR kit has a higher accuracy of detecting COVID-19 across the various mutant strains of the virus responsible for the global pandemic.

As we are going through a second wave of the pandemic with multiple variants of the virus, the selection of target genes in multiplex RT-PCR assay is becoming critical for accurate detection of the virus.

Even though coronaviruses make far fewer errors than other RNA viruses, the mutations in S, R, and N genes often interfere with RT-PCR assay. For example, the "variant of concern" B1.1.7 (also known as the UK variant) has a 69-70del, due to deletion of 6 bases in the RNA, which resulted in S gene drop out from RT-PCR assay.

The new multiplex RT-PCR kit developed by Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Department of Science and Technology, Government of India targets two SARS CoV-2 genes: RdRp and ORFb-nsp14, and the human RNAse P gene as the internal control to help detect a range of mutant strains.

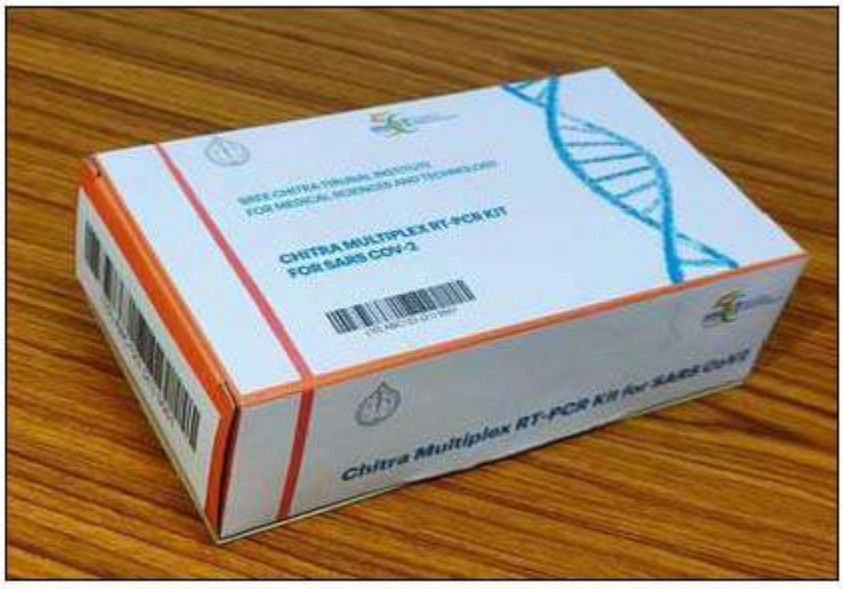
Various studies have shown that RdRp and ORF1b-nsp14 genes are more sensitive in detecting COVID-19. In order to target the multiple variants in the second wave, using two highly accurate confirmatory genes like RdRp and ORF-nsp14 can give precise results. The ORFb-nsp14 is one of the least mutated genes in COVID-19, and currently there are no kits in the market with ORF-nsp14 as the target.

The new kit is based on multiplex Taqman chemistry, amplifying all three genes in a single reaction. The amplification time for the assay is 45 minutes, apart from the time required for the RNA isolation from nasopharyngeal swab samples. Multiplexing two confirmatory genes will help shortlist possible new variants if one of the genes fails to amplify and can be marked for sequence analysis.

ICMR has validated this kit at the National Institute of Virology, Pune and found that it has 97.3% sensitivity and 100% specificity in COVID-19 detection.

SCTIMST has signed a non-exclusive license MoU with Huwel Lifesciences, Hyderabad on 14 May 2021 to commercialize the kit.

"This unique RT-PCR kit will be a significant weapon in our fight against COVID-19 by a facile detection of SARS-CoV-2 mutations which are becoming increasingly important," said Secretary, DST, Prof. Ashutosh Sharma.



Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1719628

TIFAC suggests integrated COVID-19 Command Centre

A COVID-19 Command Centre should be established in each district, equipped with necessary infrastructure and manpower to ensure both-way information flow between COVID-19 Command Centre and villages. This can help optimum use of available resources and also usage of data for other scientific purposes. It has been suggested by Technology Information Forecasting and Assessment Council (TIFAC), an autonomous institute under the Department of Science and Technology, a technology think tank.

COVID-19 surge has become more serious than predicted, spreading faster, particularly during second wave and penetrating in the rural areas as well. As the pandemic spreads in the villages

of India in varying intensity, accurate information about infection rate, recovery rate, death rate, supply of medicines, availability of medical infrastructures like hospital beds and oxygen need to be available to the administration on a click of a mouse to facilitate efficient management of resources towards containment of COVID-19 spread across India.

According to TIFAC, all the district COVID-19 Command Centres should be connected with the State COVID-19 Command Centre, which will be the repository of information of the entire state. Similarly, all State COVID-19 Command Centres will be connected digitally with the Central COVID-19 Command Centre so that information of all states and villages of India will be available centrally.

The entire information should be transferred and stored digitally so that time-series data are available at Central COVID-19 Command Centre for the whole of India and at States COVID-19 Command Centre for the entire states.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1719928

Mega make-shift COVID centre set up at Kochi Refinery premises

A 100-bed make-shift COVID treatment centre opened on 14 May at Bharat Petroleum Corporation Limited's (BPCL) Kochi Refinery-operated school, adjacent to its premises, in Ambalamugal, Kerala. BPCL, a 'Maharatna' PSU under the Ministry of Petroleum and Natural Gas, Government of India, will provide free oxygen, power and water to the Centre. The oxygen will be supplied through a dedicated stainless steel pipeline. The medical facility will have 100 beds in the first phase, which will be later expanded to accommodate 1,500 beds, in the same premises.

BPCL has been at the forefront in supporting the healthcare system, by upgrading its facilities at Mumbai and Bina Refineries for supply of 600 MT free gaseous oxygen per month to government hospitals and medical centres, besides supplying 100 MT liquid oxygen from Kochi Refinery every month.

BPCL is also setting up PSA Oxygen Plants in two government hospitals in Maharashtra, three hospitals in Kerala and five hospitals in Madhya Pradesh. Additionally, bottling compressor is also being put up at the refinery, which will help in oxygen supply through cylinders.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718630

AIIMS doctors provide guidance on medication and care for mild COVID-19 patients

The commonly observed symptoms among COVID-19 patients are fever, dry cough, tiredness and loss of taste or smell. Irritation in throat, headache, body ache, diarrhoea, rash on skin and redness in eyes are also observed in rare cases. If you observe any of these symptoms, you should immediately isolate yourself from others. This was informed by Dr Neeraj Nishchal of AIIMS, Delhi, during a webinar on "Medication and Care in Home Isolation", for patients who are tested positive for COVID-19. The webinar was organized by The Centre of Excellence of the Union Health and Family Welfare Ministry.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718783

POWERGRID takes initiatives to fight COVID-19

Power Grid Corporation of India Limited (POWERGRID), a 'Maharatna' Company under Ministry of Power, Government of India has actively taken up various initiatives for extending timely help to its employees in all its offices across the country.

Vaccination is the most crucial weapon to fight this pandemic. In this line, POWERGRID is organizing vaccination camps for its employees and their family members across all its establishments in India, including the Corporate Centre in Gurugram, all offices including Regional Headquarters and the Sub-stations located in remote parts of the country. The cost for vaccinating the staff and their families is being borne by the Company. The vaccine camps are being organized for both age groups 18-45 and more than 45 years regularly for providing the first and second doses of vaccines. This facility has been extended by the POWERGRID to its superannuated employees, contractual employees and their families also. Besides, the vaccination camps were also organized for employees from Ministry of Power, Power PSUs. The vaccination drives are receiving an overwhelming response.

POWERGRID is providing complimentary meal service to all the affected employees and their families. The same practice is also being followed at the Regional Headquarters and other establishments of POWERGRID.

POWERGRID has increased the capacity of its isolation centre in Sector 46, Gurugram which it had set up amidst the pandemic in 2020. A new isolation centre in Manesar has also been set up which is available to the superannuated employees and their families. The isolation centre in Manesar has a capacity of 50 beds and separate facility of beds for those who require to be quarantined.

Under its CSR, POWERGRID had handed over nine ICU Ventilators to the tune of Rs. 1,14,30,000 to the Dean, Government Medical College, Chandrapur. These ICU ventilators are being used to treat the patients during the on-going pandemic. Further, masks and sanitizers are being distributed to the administration in various states including Odisha where 5000 masks and 500 bottles of hand sanitizers were handed over to ADM, Angul for protection and prevention of COVID-19. Understanding the importance of ambulances in the present pandemic, POWERGRID handed over an ambulance to Vadodara Municipal Corporation to take care of COVID-19-affected patients.

Dedicated teams have been constituted by the Human Resource Departments across the regions for helping the staff and their families who are unfortunately suffering from the pandemic. The team is working 24x7 for helping the staff and their family in getting hospital admission and arranging oxygen and medicines etc. The details of these services are being provided to the employees through the centralized helpline numbers which have been shared on the intranet of all regional headquarters and the intranet websites of all other establishments.

The Corporate Communications Department is working towards making the employees and common masses aware about COVID-19 protocols and appropriate behaviour. Government of India initiatives are also being highlighted through creative video, templates and other motivational contents. These are helping in creating awareness.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718817

NTPC augments COVID Care Facilities across the country

NTPC Ltd, India's largest integrated energy company under Ministry of Power has added more than 500 beds with oxygen support and more than 1100 isolation beds across plants in various states to provide support to the critical COVID Care.

In NCR region, the Company has set up COVID care centres with facility of 200 oxygen-supported beds and 140 isolation beds in Badarpur, Noida and Dadri. Further, the Company has set up a 500-bed COVID health centre at Sundargarh in Odisha where 20 ventilators have been provided.

Going further, the company has already placed orders for 11 oxygen generation plants in NCR. Besides, two large oxygen generation plants having bottling facility are being set up. Further, the company is also setting up oxygen generation plants at 8 different locations in other states. In addition, the Company has extended support for installation of oxygen generation plants at different Government hospitals in other states.

NTPC has also started vaccinating those who are eligible in the 18-44-year-old category at many of its plant locations. Vaccination drives have been undertaken across NTPC stations in coordination with respective State administrations.

India's largest integrated energy player is running 24X7 Control Rooms across plants for better coordination for patients across sites which are coordinated by a special task force. The task force also helps in coordination for hospital beds and other treatment facilities across various empanelled and non-empaneled hospitals. The 24X7 control rooms also coordinated for procurement of medicines, hospital equipment, services along with daily reporting and MIS.

Further, NTPC is in coordination with hospitals and its medical team to ensure that all COVID-19 patients are rendered the best healthcare support. NTPC has also collaborated with the Ministry of Power and Ministry of Health to facilitate the availability of necessary but scarce medicines and other essentials like oxygen.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718789

CCMB initiates training on faster, low-cost COVID-19 testing

CSIR-CCMB has shown that biological samples from dry swabs can be directly used for COVID-19 testing without RNA isolation. This will bring down the costs of COVID-19 tests. No Viral Transport Medium is needed and sample handling is easier. CSIR-CCMB are training ICMR-testing centres to adopt the protocol.

Website link:
https://www.ccmb.res.in/

CDRI offers screening of compounds against selected SARS-CoV-2 targets

CSIR-CDRI offers screening of compounds and selected extracts for companies, start-ups and other institutes against selected SARS-CoV-2 targets on payment or collaborative basis as per the needs of the particular entity.

a) An attractive drug target among coronaviruses is the main protease (Mpro, also called 3CLpro) because of its essential role in processing the polyproteins that are translated from the viral RNA. CSIR-CDRI can screen compounds against the target and also will carry out co-crystallization studies based on the particular requirements.

b) The papain-like protease (PLpro) of SARS-CoV-2 plays essential roles in virus replication and immune evasion and represents an attractive drug target. CSIR-CDRI can screen compounds and carry out co-crystallisation studies against this target based on the particular project needs.

Website link:
https://cdri.res.in/covid19Screening.aspx

Various stakeholders partner to provide insights into the genetic epidemiology of COVID-19 in Kerala

COVID-19 Genetic Epidemiology Kerala is a unique partnership between the Department of Health & Family Welfare, Government of Kerala, National Health Mission, Govt. of Kerala, CSIR Institute of Genomics & Integrative Biology (CSIR-IGIB) and various clinical and public health centres in Kerala aimed at providing insights into the genetic epidemiology of COVID-19 in Kerala.

The initiative aims to combine genomic and epidemiological information to guide public health interventions and policies. The initiative would also enable the understanding of transmission patterns, outbreaks apart from enabling evidence-based policies for testing, intervention. It is also expected that the initiative would also serve as a framework for evaluating policies.

Website link:
https://genescov2.genomes.in/home

INSACOG to monitor the genomic variations in the SARS-CoV-2

INSACOG, the consortium of 10 national laboratories, is jointly established by the MoHFW and DBT to monitor the genomic variations in the SARS-CoV-2 for genomic, epidemiological and clinical correlation to assist public health response. The Indian SARS-CoV-2 Consortium on Genomics (INSACOG) is since then carrying out genomic sequencing and analysis of circulating COVID-19 viruses and correlating epidemiological trends with genomic variants. Genomic variants of various viruses are a natural phenomenon and are found in almost all countries.

Website link:
http://dbtindia.gov.in/insacog

Ayush Ministry launched nationwide distribution campaign of AYUSH-64 & Kabasura Kudineer

In a concerted response to the second surge of COVID-19 infection in the country, Ministry of Ayush has launched a massive nationwide campaign today to distribute its proven poly herbal Ayurvadic drugs AYUSH-64 and Sidha drug Kabasura Kudineer for the benefit of the vast majority of out-of-hospital COVID patients. The efficacy of these drugs has been proved through robust multi-centre clinical trials. The multi stakeholder campaign being launched by Shri Kiren Rijiju, Minister of State (independent charge) for Youth Affairs and Sports and Minister of Ayush (additional charge) will ensure that medicines reach the needy in a transparent and efficient manner. The main collaborator in the campaign is Sewa Bharati.

A comprehensive strategy of distribution has been chalked out and the role out will unfold in a phased manner, utilising the wide network of various institutions working under the aegis of the ministry and this will be supported by the countrywide network of Sewa Bharati.

It is worthwhile to note that since the COVID-19 pandemic hit the country, the Ministry of Ayush has taken several initiatives toward control and mitigation of it, while also working in close collaboration with Ministry of Health & Family Welfare in the fight against the disease. With the latest initiative of the Ministry to launch a nationwide campaign for distribution of AYUSH-64 and Kabasura Kudineer, India aims to strengthen its position in fight against COVID-19 pandemic.

The Ministry has taken several initiatives and setup an Interdisciplinary AYUSH Research and Development Task Force involving experts from diverse fields to formulate and develop strategies for control and mitigation of COVID-19. Many clinical and observational studies have been undertaken to understand the role of AYUSH interventions in mitigation and management of COVID-19 whereas various studies were carried out on AYUSH-64, an Ayurvedic formulation developed by the Central Council for Research in Ayurvedic Sciences (CCRAS)and Kabasura Kudineer, a classical Siddha formulation.

The Ministry of Ayush-Council of Scientific and Industrial Research (CSIR) collaboration has recently completed a robust multi-centre clinical trial to evaluate the safety and efficacy of AYUSH-64 in the management of mild to moderate COVID-19 patients. Kabasura was also subjected to clinical trials for studying the efficacy in COVID-19 patients by Central Council for Research in Siddha (CCRS) under Ministry of Ayush and is also found useful in the treatment of mild to moderate COVID-19 infection.

AYUSH-64 is recommended in National Clinical Management Protocol based on Ayurveda and Yoga which is vetted by National Task Force on COVID Management of ICMR and Guidelines for Ayurveda Practitioners for COVID-19 Patients in Home Isolation. Kabasura Kudineer is included in Guidelines for Siddha Practitioners for COVID-19, Ministry of Ayush, Govt. of India.

Website link:
https://pib.gov.in/Pressreleaseshare.aspx?PRID=1716729

DRDO develops COVID-19 antibody detection kit

Defence Institute of Physiology and Allied Sciences (DIPAS), a laboratory of Defence Research and Development Organisation (DRDO), has developed an antibody detection-based kit 'DIPCOVAN', the DIPAS-VDx COVID-19 IgG Antibody Microwell ELISA for sero-surveillance. The DIPCOVAN kit can detect both spike as well as nucleocapsid (S&N) proteins of SARS-CoV-2 virus with a high sensitivity of 97 per cent and specificity of 99 per cent. The kit has been developed in association with Vanguard Diagnostics Pvt Ltd, a development and manufacturing diagnostics company based at New Delhi.

The DIPCOVAN kit was developed indigenously by the scientists, followed by extensive validation on more than 1,000 patient samples at various COVID designated hospitals in Delhi. Three batches of the product were validated during last one year. The antibody detection kit is approved by Indian Council of Medical Research (ICMR) in April 2021.

DIPCOVAN is intended for the qualitative detection of IgG antibodies in human serum or plasma, targeting SARS-CoV-2 related antigens. It offers a significantly faster turn-around-time as it requires just 75 minutes to conduct the test without any cross reactivity with other diseases. The kit has a shelf life of 18 months.

Industry partner Vanguard Diagnostics Pvt. Ltd will commercially launch the product during the first week of June 2021. Readily available stock at the time of launch will be 100 kits (approx. 10,000 tests) with a production capacity of 500 kits/month after the launch. It is expected to be available at about Rs 75 per test.

The kit will be very useful for understanding COVID-19 epidemiology and assessing an individual's previous SARS-CoV-2 exposure.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1720604

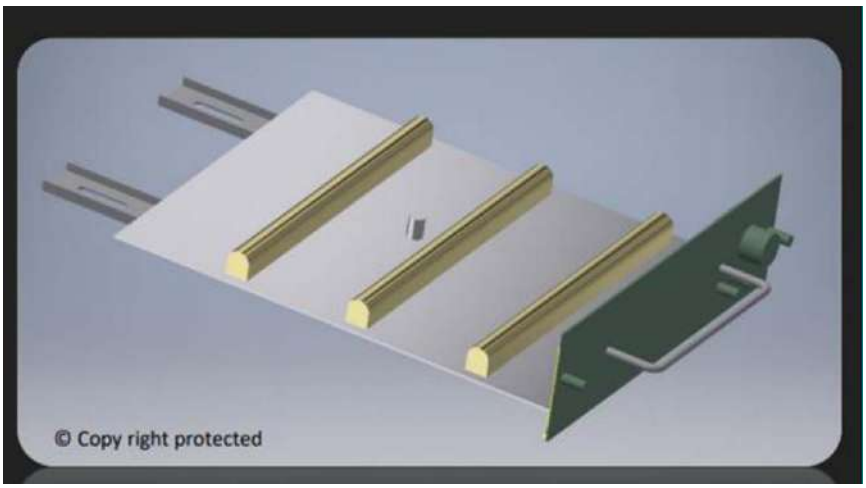
CSIR-CSIO transfers the UV Disinfection technology to combat SARS-CoV-2 to 27 indigenous manufacturers

There has been increasing evidence for airborne route of transmission of SARS-CoV-2 via aerosols which is now considered to be important by international agencies WHO, REHVA, ASHRAE and by health authorities in several countries. The airborne transmission is a major risk in indoor settings. Significantly, research carried out by CSIR constituent labs, Centre for

Cellular and Molecular Biology (CSIR-CCMB) and CSIR-Institute of Microbial Technology (CSIR-IMTECH) in September 2020 had demonstrated experimentally that SARS-CoV-2 viral particles could be detected in air even after 2 hours of exit of infected persons from a room and at distances much greater than a few meters as well (S C. Moharir et al., 2020) strengthening evidence of airborne transmission of the SARS-CoV-2.

The product developed by the CSIR-Central Scientific Instruments Organisation (CSIO) is tested for more than 99% disinfection and could be used as a retrofit solution to Air Handling Units (AHUs) of buildings, transport vehicles and other spin off applications. The UV-C Air Duct Disinfection System is energy efficient. It improves airflow through coils, enhances indoor air quality, requires less maintenance, easy to retrofit with any existing system having AHU ducts, and has low initial setup cost. The system comes with commercialized standards and certifications.

CSIR-CSIO has transferred the technology to 27 companies, for scaling up the manufacturing.



UV-C Air Duct Disinfection System

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1720933
https://www.medrxiv.org/content/10.1101/2020.12.30.20248890v1

Countrywide AYUSH COVID -19 Counselling Helpline operationalized

A dedicated community support helpline has been operationalized by the Union Ministry of Ayush to provide AYUSH-based approaches and solutions for the challenges raised by COVID-19. The toll-free number is 14443. The helpline is operational pan-India from 6 am to 12 midnight, all seven days of a week.

Through the helpline 14443, experts from different streams of Ayush, namely Ayurveda, Homeopathy, Yoga, Naturopathy, Unani and Siddha would be available to address queries of the general masses. These experts would not only be providing counselling and feasible remedies to the patients but would also guide them about the availability of nearby Ayush facilities.

The experts would also be suggesting post COVID-19 rehabilitation and management approaches to the patients. The helpline is IVR (Interactive Voice Response) equipped and currently available in Hindi and English. Other languages will be added in due course of time. The helpline will initially take 100 calls simultaneously and the capacity would be increased in future, as per requirements. Through the helpline, the Ministry of Ayush aims to contribute to

the community-wide effort to limit the spread of COVID-19. The effort is supported by the NGO, Project StepOne.

Notably, the AYUSH systems are among the oldest living medical systems used for health and wellbeing and are formally recognised in the country. The use of these systems has increased during the current pandemic due to their unique approaches for strengthening host defence. These are found useful as effective, safer, conveniently accessible, and affordable prophylaxis in the management of COVID-19. In addition, the therapeutic potentials have also been explored and two potential Polyherbal formulations namely AYUSH-64, an Ayurvedic formulation developed by CCRAS and Kabasura Kudineer of Siddha system has been found effective in the management of mild to moderate COVID-19 conditions. The Ministry of AYUSH is promoting these medicines extensively for the benefit of common people.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1720519

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6
START-UP SPOTLIGHTS

Numerous start-up companies have timely contributed to the warfare against fighting the pandemic out in countless ways. Here is an effort to compile those contributions and sew them up for the usage of the entrepreneur communities.

START-UP SPOTLIGHTS

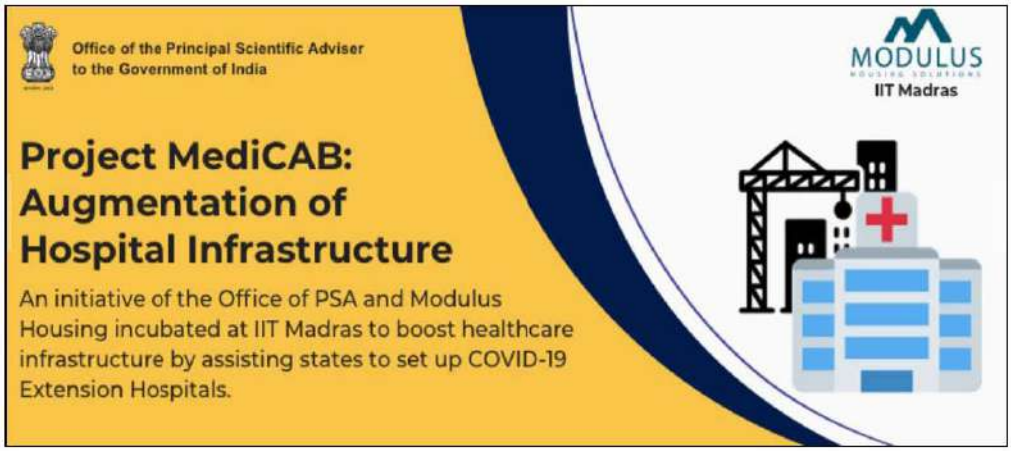
IIT Madras start-up's efforts to develop 'Portable Hospital Unit'

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

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

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

Contact Info: secy@psa.gov.in; sapna.poti@gov.in.



Website link:
https://static.psa.gov.in/psa-prod/psa_custom_files/All%20States%20v.04.pdf
https://www.psa.gov.in/

Oxygen concentrators developed by Oxyheal Pvt Ltd

Oxyheal Pvt Ltd, incubated at Kongu Engineering College, Tamil Nadu, has developed oxygen concentrators that use Hyperbaric Oxygen Therapy to treat chronic wounds, which are wounds that do not heal over a long period of time.

The device is portable and significantly easier to use and cheaper for the end-user in comparison to presently existing technologies. It can be used to treat COVID-19 patients whose oxygen level drop below 95%.

Contact Info: manashsharma20@gmail.com

Website link:
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19
http://oxyheal.co.in/index.html

IIT Kanpur – Nocca develops invasive ventilator with IoT-enabled features

Pune-based Nocca Robotics is engaged in designing and manufacturing robots that clean solar panel in a waterless manner. Using the Team's extensive experience in electromechanical control systems in their regular business, they decided to contribute in nation's fight against COVID-19 by designing a ventilator along with the active involvement and guidance from the incubator of IIT Kanpur.

Nocca Robotics has developed a ventilator which operates in both invasive and non-invasive, pressure-controlled mode and solar-powered with low-wattage requirement. The ventilator will be permanently connected to a mobile phone which will be used to control the device and display critical information. The device does not require any form of medical air; it is capable of operating on its own in ambient air. There is also a provision of attaching an oxygen cylinder when required.

Website link:
https://www.noccarc.com/
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19

Cardea Biomedical Technologies develops indigenous Tele-ECG Machine

Cardea Biomedical Technologies Pvt Ltd has developed Accurate Tele-ECG on mobile which can help bring down the number of fatal heart attacks. Heart patients are more prone to COVID-19 severity. During treatment of COVID-19 patients with hydroxychloroquine azithromycin, it is essential to perform ECG and calculate QTc evaluation; avoidance of non-essential

QT-prolonging medications; and identifying and correcting electrolyte imbalances (potassium, magnesium, and calcium).

ATOM ECG or Accurate TeleECG On Mobile allows capture of a medical-grade 12 lead ECG over a smartphone with immediate remote expert consultation. It empowers doctors, health workers and nurses to perform treatment of COVID-19 patients with confidence. The recorded ECG can be instantly sent to a cardiologist for their expertise before administering the drugs and also continue a follow-up during the course of the treatment.

Website link:
https://atom-ecg.com/
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19

Incredible Devices develops safe and affordable Catheter Reprocessing System

Shortage of medical devices at hospitals may happen due to lack of imports and logistics issues impacting manufacturing supply chain world-wide. Manual reprocessing of medical devices shall lead to higher rate of spread of infections, risking both patients and hospital staff.

Incredible Devices Pvt Ltd, a Mohali-based start-up, has developed a Catheter Reprocessing System (CRS). It defeats the current challenges of manual cleaning of catheters. It is an automatic computer-guided catheter reprocessing machine with inbuilt self-testing and calibration which ensures best cleaning of catheters.

Its inbuilt computer stringently monitors every process and effectively cleans catheters with precision and accuracy which is not possible with conventional manual method. It helps to eliminate all kind of human errors thereby ensuring safe and affordable treatment.

Contact Info: contactus@incredibledevices.in

Website link:
http://www.incredibledevices.in/index.html
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19

Blackfrog Technologies develops portable precision refrigeration system for transportation

Maharashtra-based start-up, Blackfrog Technologies Pvt Ltd developed a portable precision refrigeration system called Emvólio for transport of blood, serums, vaccines, etc. This technology has now been leveraged for transport of COVID-19 samples. A safe and controlled platform for the transport of nasal/throat swabs from collection centres/ hospitals to the certified testing centres has been developed for improving accuracy in testing and minimizing false negatives (arising from thermal degradation of viral specimens). This device will reduce the economic burden of wasted vaccines and optimize human resources in vaccine delivery by nullifying the need for repeated immunization visits to account for the administering of unviable vaccines. Importantly, the level of portability and ease of charging that it gains from being battery powered sets Emvólio apart from other models, which relies on less efficient and impractical means, such as frozen PCM, use of Ammonia or refrigerants, to generate cooling.

Emvólio has a patented rapid-cooling technology that ensures temperature stabilization to safe-limits over 96% faster than ice-based technologies, during temperature excursions (arising from operational requirements or human interference). In practical terms, this means minimal freeze-thaw cycles for the specimen and thus accurate results from testing. The rugged 2-liter-capacity cold chamber (as per WHO standards) is designed with dual-layered stainless steel 304 for corrosion resistance and easy sterilization.

Contact Info: info@blackfrog.in

Website link:
https://www.blackfrog.in/
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19

Start-up at SINE, IIT Bombay develops ventilator to fight COVID-19 pandemic

Combat Robotics, a start-up from Pune, has developed Ventsa (Respiratory Aid) that has 70% features of a full-fledged ventilator to treat COVID-19 patients. It can be used in a car, in an ambulance or in an office in the COVID centres. It is portable and has a resuscitator-based pumping mechanism which can have linear flow for the patients with ARDS; if the patient's oxygen levels are average it can help the patient to maintain a safe position. It is independent of oxygen-moderate patients and also has a provision to attach an oxygen generator or an oxygen cylinder. It also has a battery backup for 3 to 4 hours which can help the patients in rural parts of the country where power cuts can happen. It has a seven-inch display where all key parameters can be seen with a settable touchscreen it can sink with patients' inhalation and exhalation profiles to have them maintain the oxygen levels. They can have settable tidal volume, Tidal volume seamlessly from 100-800 mL; Control I/E ratio in all ratios 1:4 to 4:1; Battery backup With UPS; Provision to attach the automotive battery; Optimized Noise Vibration Harness parameters; Safety mechanisms like fault detection and alarms available.

Combat Robotics India Private Limited is a robot designing and manufacturing company with a key focus on innovation, integration, and militarization of high endurance reliable, rugged user-friendly robots mainly for life-saving applications.

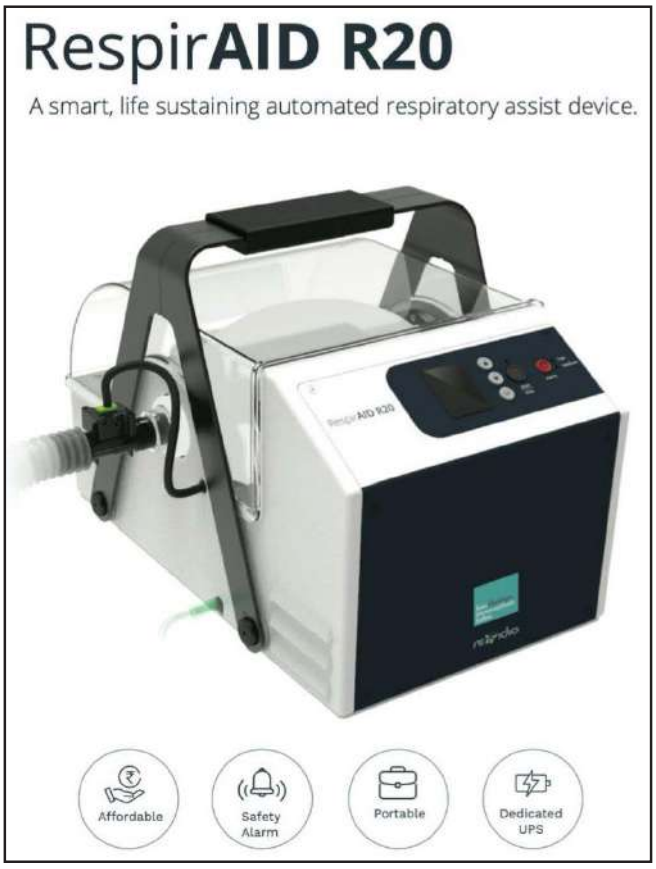
Contact Info: gs@combatroboticsindia.com

Website link:
https://www.combatroboticsindia.com/
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19

Bengaluru-based start-up developed portable ventilator for coronavirus patients

Coronavirus causes respiratory distress in infected patients and has led to an increased need for ventilation infrastructure. Bengaluru-based start-up Biodesign Innovation Labs is providing a portable ventilator at low cost to deal with the coronavirus pandemic.

RespirAID is a portable mechanical ventilation device that provides volume-controlled positive pressure ventilation to patients during emergencies, casualty, transport ventilation, ambulances and post-operative care. The device delivers all the essential ventilator parameters and can save lives of patients. Breath rate, TV, IE and PIP, PEEP is delivered with volume-controlled mandatory ventilation.



Website link:
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19
https://df8k7gbekvfuy.cloudfront.net/innovations-6751-docs/RespirAID%20Presentation%20for%20Clinicians%20and%20Service%20Providers%20.pdf

Dripo: Smart infusion monitoring device developed by Kerala-based start-up

A Kerala-based start-up, Evelabs, has developed a device named Dripo, which is a wireless infusion monitor that can be clamped to an IV set to monitor drip rates. It acts as an intelligent bystander and sends information and alerts on the status of drip to nursing stations enabling nurses to monitor IV drips easily maintaining safety and efficacy.

The device has a patented two-arms clamping mechanism at the rear side. The device is installed by simply sliding the device with the drip chamber in between the clamping arms. Once installed and set up the device will send data to a central hub installed at the nursing station, where rate changes and completion of every source will be alerted. The hub is also a smart infusion chart, where the status of every on-going and upcoming infusion and patient history will be shown.

Website link:
https://www.investindia.gov.in/bip/resources/innovations-against-covid-19
https://www.evelabs.co/

Ayu Devices develops Digital Stethoscope for COVID-19

Can medical equipment be designed in a manner that can keep doctors safe and cater to unique emergency requirements of the COVID-19 crisis? Several start-ups supported by the DST are showing the way with stethoscopes that doctors can use without touching the patient, oxygen concentrator that can help the hospitals generate their in-house oxygen, and portable and app-controlled IoT-based ventilator system. Several Indian medical devices manufacturers and indigenous automation companies took up the pandemic as a challenge and came up with innovative designs of ventilators, portable respiratory aids or devices for contactless diagnosis and monitoring of the patients. DST, through its CAWACH initiative scouted, evaluated, and supported promising ventilator, respiratory aids, and other vital medical equipment from five companies who have now taken their products to deployment stage.

Maharashtra-based start-up Ayu Devices is a technology-based healthcare company, incubated at Society for Innovation and Entrepreneurship (SINE), IIT Bombay in 2017. It has developed a digital stethoscope that can help doctors listen to heart and lungs sounds while keeping at a safe distance from the patients. AyuSynk's unique stethoscope design allows healthcare workers to perform auscultation while being protected in an isolation environment. It can be used with protective covers in the emergency department to reduce contamination when pre-screening admissions. AyuSynk can be used directly using earbuds or headphones via Bluetooth within the isolation room or to a consultant outside the room or send sounds via email or instant messaging.

The device identifies abnormal sounds and helps diagnose patients. It is designed as a wireless module to enhance the Bluetooth range and help it to be controlled from a distance. While an existing digital stethoscope uses smartphone's Bluetooth, their device works with an additional Bluetooth module to increase the range and consistency in the data. It is also fitted with filters to remove external noise for clear sound making it usable in Indian clinical settings where there is lot of background noise in OPDs. This has enabled doctors to listen to chest sounds while covered in PPEs which is not possible with conventional stethoscope. They are further scaling up the manufacturing to cater to the increasing need and have successfully commercialized the stethoscope for the telemedicine segment. The company has sold 1,000 units that have been deployed in many hospitals.

Ayu Devices Pvt. Ltd.

The initiative has been supported under 'Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH)' programme by National Science & Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology (DST), Government of India. Given the impact of COVID-19 globally and in India, there was an urgent need to support R&D efforts in this direction and end any further damage to the economy. During the first wave of COVID-19 in India, DST supported the innovations offering comprehensive solutions to fight the pandemic through the start-up ecosystem.

Website link:
https://www.ayudevices.store/

Walnut Medical develops portable oxygen concentrator capable of generating oxygen in-house

A portable oxygen concentrator by Ambala-based Walnut Medical helps hospitals generate oxygen in-house. It is an intelligent, closed-loop system which monitors oxygen level and gives enough oxygen to the patient as per the patient's need. It produces around 95% pure oxygen by nitrogen separation method and can be very helpful in these crisis times such that every hospital can generate oxygen in-house. This is the first oxygen concentrator made in India and is fitted with automated oxygen flow technology which will prevent patients suffering from hyperoxia.

DST's support, through CAWACH programme by NSTEDB helped them push their endeavour forward with 5-litre and 10-litre oxygen concentrator models and oximeter as well. Manufacturing of oxygen concentrators requires huge moulds and the support helped them invest on quality moulds to compete against products from Japan, USA and China. IIT Delhi incubation team worked with them to help the technology see the light of the day. Walnut Medical will be donating 50 oxygen concentrators to Government hospitals and then launch the product in the market.

Walnut Medical Pvt. Ltd.

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Website:
www.walnutmedical.in

Hyderabad-based start-up come up with a smart ventilation system - Jeevan Lite

The outbreak of COVID-19 has led to the huge demand for ventilators, as infected patients, especially those who suffer acute respiratory distress syndrome (ARDS), are in a dire need of this life support system to aid their respiratory functions. A ventilator is the most widely used short-term life support technique. It has been proven to be the defining intervention of intensive care medicine, especially in these critical times. Aerobiosys Innovations Private Limited, a company co-founded in 2019 by young Biodesign Innovation fellows of the Center for Healthcare Entrepreneurship (CfHE) and incubated at the Indian Institute of Technology, Hyderabad aims to develop affordable life-saving medical equipment with advanced technologies for hospitals, medical institutions and individual practitioners. This Hyderabad-based start-up has come up with a smart ventilation system named Jeevan Lite.

This smart ventilation system is a portable, cost effective, IoT enabled and powered by lithium ion batteries. It operates uninterrupted in SIMV, CMV, Adaptive and Hybrid modes of ventilation for 5 hours and is both invasive and non-invasive, with a smartphone app to control the device. It has been designed based on the turbine driven flow method which provides independence from gas cylinders or compressors. It also comes with an integrated nebulizer with auto cut off precise timer. Jeevan Lite features all the essential modes expected from an advanced ventilation system in one adaptable platform. It also presents a wide range of tools to help you stabilize the patient and wean them off the ventilator.

The system has intuitive UI design which provides each function in logical order so that clinicians do not need to navigate a complex menu. In addition, both the valves and flow sensor support autoclaving. This safety concept is designed to meet the current clinical trends of protecting patients even under the most demanding conditions. The system displays real-time information of the breath pattern and other critical lung parameters. It can attach to an oxygen cylinder and can operate on its own in ambient air. The accessories and consumables are especially developed for the highest possible patient safety and ease of use. This enables the hospitals and the institutes to choose between reusable and disposable parts, according to their institutional policies.

The initiative has been developed with CAWACH support, a programme under the umbrella of NSTEDB of DST. The programme supports innovations in the areas of diagnostics, devices, informatics including bio-informatics and information management systems, any intervention for the control of COVID-19 and/or start-up ideas to address/mitigate various challenges faced by the country/society due to severe impact of COVID-19.

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Jeevtronics develops SanMitra 1000 HCT, hand-cranked defibrillator

Statistically, India's death rate due to sudden cardiac arrest is 3 to 4 times that of developed countries. A defibrillator is mandatory in all nursing homes and is a critical instrument in ICUs and ambulances. In India, these devices are majorly imported, and many small nursing homes use refurbished devices to meet the regulatory requirements. However, there is a possibility of device malfunctioning due to various reasons. Also, the availability of defibrillators required in hospitals and ambulances is extremely low. Primary reasons are lack of reliable electricity, lack of affordability, poor quality refurbished devices, and high cost of battery replacement.

Catering to this problem, Pune-based social and technology start-up Jeevtronics has developed probably the world's first dual-powered bi-phasic defibrillator, SanMitra 1000 HCT. This defibrillator restores normal heartbeat by sending an electric pulse or shock to the heart. It is used to prevent or correct an arrhythmia, a heartbeat that is uneven or that is too slow or too fast. This works directly on AC mains as well as on a built-in hand cranked generator for treating sudden cardiac arrest.

SanMitra 1000 HCT is particularly useful for disaster-struck situations (e.g., COVID-19). Sequestration areas inside hospitals for COVID-19 victims need lots of defibrillators. It saves the cost of battery replacement (usually Rs. 12,000 to Rs. 35,000 per year) for the hospitals. It is designed to international IEC standards for medical devices and has been tested and approved by the NABL-accredited lab. It has been tested for 16,000 charge-discharge cycles thereby making it super long-life world-class product. It is designed to sustain the most stringent vibration and drop test standards so that the customers can be rest assured that they can install it in ambulances that travel on rough roads. Hopefully, this will significantly improve access to defibrillators in all low- and middle-income areas, which do not have reliable electricity supply.

The initiative has been supported under 'Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH)' programme by NSTEDB, DST.

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Turtle Shell Technologies develops Dozee, MEWS-based alert mechanism

To withhold the tsunami of COVID-19 cases, India has 20 lakh hospital beds and only one lakh ICU beds. Coupled with the shortage of trained nursing staff, it has become nearly impossible to keep an active watch on the health of all the patients continuously, especially outside the ICU. Currently, hospital staff has to manually visit patients every couple of hours to measure their vitals. Without continuous monitoring, any deterioration in a patient's health can go

unnoticed and lead to complications. Remote patient monitoring is rapidly becoming a way for hospitals and healthcare providers to deliver an enhanced level of quality patient care through the pandemic and beyond. From COVID-19 patient care, to post-surgical follow-up, to on-going care management for patients with chronic illness, there was a dire need for a clinical-grade technology to provide quality care safely and at scale.

Bengaluru-based healthcare start-up Turtle Shell Technologies launched a contactless remote patient monitoring solution, Dozee, for hospitals. The Dozee Pro Solution features an AI-powered triaging system which enables remote monitoring of patients outside of the ICU. It is a CE-marked, contact-free health monitor with clinical-grade accuracy with remote access and multi-parameter early warning score (MEWS)-based alert mechanism. It enables the continuous (more than 100 times per hour) and accurate monitoring of a patient's heart rate, respiratory rate, and other clinical parameters like sleep apnoea and myocardial performance metrics without coming in contact with the patient. It comes with an industrial grade contactless sensor, communication pod, and cloud-based patient monitoring tool and the AI-powered triaging system that captures real-time body vitals and provides round-the-clock monitoring for patients who were previously manually monitored only every couple of hours. The Dozee Pro also features an extensible platform where it integrates with other devices such as SpO2 sensor, ECG, and temperature sensor to provide the entire suite of vitals parameters including oxygen saturation, body temperature, and ECG.

The system continuously monitors a person's heart rate and respiration rate with the help of the system placed under the mattress, converting any bed into a step-down ICU without any cuffs or leads. It also connects to other Bluetooth-based peripherals like SpO2 and BP Monitor to provide access to more vitals remotely. This consistent stream of patient data aids the medical staff with early detection of patient deterioration and notifies the care team of any abnormalities before it becomes critical. Doctors and healthcare teams can remotely monitor the patients' health from the centralized patient monitor, where at a time, hundreds of patients can be monitored from the web-dashboard and also from a mobile phone app. Custom alerts can be put on every patient, helping doctors optimize treatment plans, focus on deteriorating patients, and provide improved proactive care.

In the COVID-19 scenario, Dozee is playing a crucial part in continuous and proactive monitoring of asymptomatic and mildly symptomatic patients in isolation wards and quarantine. It is also helping in monitoring at-risk patients at home and enabling doctors to continuously monitor their health. AI-based alerts are helping medical fraternity take timely actions. This has already proven lifesaving in more than 40 cases, helping flag cases of pneumonia, tuberculosis, and heart failure early. Apart from its use in hospitals, Dozee Pro also includes an integrated early warning system for patients in the post-discharge, outpatient settings and hospital-level home care settings. It helps patients, their family members, and healthcare providers with real-time data and alerts, enabling early identification of clinical deterioration.

The initiative has been developed with CAWACH support, a programme under the umbrella of NSTEDB of DST. The programme supports innovations in the areas of diagnostics, devices, informatics including bio-informatics and information management systems, any intervention for the control of COVID-19 and/or start-up ideas to address/mitigate various challenges faced by the country/society due to severe impact of COVID-19.

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Haystack Analytics provides genome-based COVID-19 solutions

Genomics has become increasingly mainstream in clinical sciences. Next-generation sequencing has ushered in the age of genomics providing the tools to gather all the relevant data for an in-depth inquiry and making simultaneous assessments possible. Today, genomics finds a footprint in identifying pathogens, antimicrobial resistance profiles, genetic disorders, oncology, and numerous non-communicable diseases. Genomics has the potential to translate into clinically actionable results that can help clinicians in making an early diagnosis. A start-up, Haystack Analytics, has developed genomic software solutions covering infectious genomics that take the turn-around time of genomics from weeks to days while preserving quality. This software is scalable to handle high sample throughput through an easy-to-use one-click format.

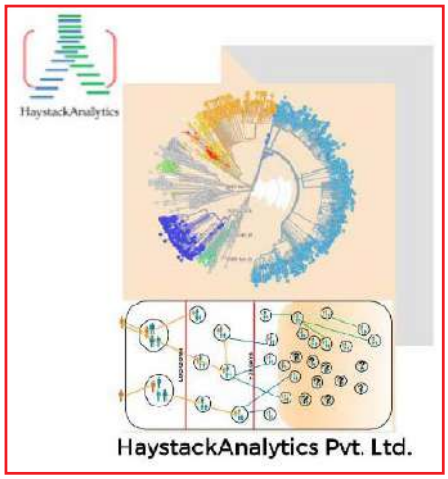
The start-up also supports and builds capabilities in genomic analysis–from the right design, to selecting the right sequencing strategy and the right bioinformatic to apply as per the requirements. Although the start-up has been working on genomics analysis for quite some time, 2020 has become synonymous with the pandemic which has further strengthened the need to make genomics analysis relevant and available for infectious disease. Solutions are needed at-scale genomic diagnostics for many diseases out there, one disease at a time.

In the COVID-19 pandemic, the start-up has made various genomics-based tools for contact tracing. They are sustainable and promote scalable identification of COVID-19 transmission, remote monitoring of transmission patterns, and also boost effectiveness of geospatial mapping of COVID-19 with genomic transmission mapping. The genomic analysis software specializes in infectious disease genomics bringing ease-of-use in analysing complex genomic data and transforming healthcare with automated one-click solutions. The services are driven by their experience in tuberculosis, infectious disease, epidemiology, molecular biology, and genomics. All the services are driven to pursue cutting-edge applications of genomics and support research and building genomic capabilities.

Some of the products developed are:

1. ΩTB - The ΩTB is a single test to give a complete genomic analysis of Mycobacterium tuberculosis. It identifies presence of resistance to 17 antibiotics, phylogeny, mixed infections, and hetero-resistance in 5 days.
2. ΩID - The ΩID is a single test to accurately identify >200 pathogens within 24 hours. The test covers bacteria, viruses and fungi that pose a significant threat to health.
3. ΩAMR - The ΩAMR is a single test to identify the presence of antimicrobial resistance within 24 hours. The test covers all key antibiotic classes.
4. ΩGut - The gut microbiome is diverse and varies among individuals. It has wide-reaching influences in our physiology ranging from metabolism, immune modulation and neurological functioning. ΩGut identifies dysbiosis whose identification can help in taking corrective and preventive action.

Haystack Analytics has tried to narrow down the widening gap that exists between the vast amounts of genomic data that can be generated today using next-generation sequencing and the limited analytical outcomes of this data. With a focus on infectious disease, they have created a platform to provide clinically relevant interpretations of genomic data to enable better decision-making in healthcare. By applying current industry standard Big Data analytics solutions to biological data, their products are able to re-imagine data-mining, representation and visualization for genomics. Also, to make genomics data consumable for all general healthcare systems, they have managed to bring the solution directly to the users with their unique computing hardware, co-developed with Intel.



HaystackAnalytics Pvt. Ltd.

The initiative has been supported under 'Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH)' programme by NSTEDB, DST.

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Xequalszero spreads happiness amid virus-struck world

Chandigarh-based start-up Xequalszero has developed a mobile-based platform - TickTalkTo which aims at addressing mental health issues. TickTalkTo is an app which helps people access immediate psychological and psychiatric help. It aims to bring mental health services to hands of millions of people who otherwise do not go to a psychologist. It integrates psychological crisis intervention into the overall deployment of epidemic prevention and control and on the premise of reducing psychological damage caused by the epidemic and promoting social stability. This web tool is primarily used for psychometric assessments and online counselling and therapy. It has an exclusive COVID-19 mental health dashboard and uses advanced analytics to improve clinical outcomes.

Launched on October 10, 2017, World Mental Health Day, it has a goal to break the stigma around mental health, by bridging the gap by providing private, confidential and anonymous therapy. It connects people with mental health professionals who can help them lead happier and healthier lives.

The initiative has been developed with CAWACH support, a programme under the umbrella of NSTEDB of DST. The programme supports innovations in the areas of diagnostics, devices, informatics including bio-informatics and information management systems, any intervention for the control of COVID-19 and/or start-up ideas to address/mitigate various challenges faced by the country/society due to severe impact of COVID-19.

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Start-up at IIT Kanpur's incubators develop oxygen concentrator

The Department of Science and Technology (DST), with the backing of the Prime Minister's Office (PMO), has sanctioned the production of oxygen concentrators from one of its science incubators at IIT-Kanpur. The start-up, Indeema Fibres Pvt Ltd in Kanpur, along with its sister concern ChemDist Membrane Systems Pvt Ltd based out of Pune, will roll out its first batch of 5,500 oxygen concentrators by May 25.

Website link:
https://siicincubator.com/

IISc start-up PathShodh gets regulatory approvals for COVID-19 test

PathShodh Healthcare, a start-up incubated at the Society for Innovation and Development (SID), Indian Institute of Science (IISc), has made a significant breakthrough in developing a first-of-its-kind, semi-quantitative electrochemical ELISA test for COVID-19 IgM and IgG antibodies. PathShodh has received the license to manufacture the test for sale from the Central Drugs Standard Control Organisation (CDSCO), after due diligence validation at the Translational Health Science and Technology Institute (THSTI), Faridabad, as per the requirements of the Indian Council of Medical Research (ICMR).

The novelty of the technology is based on the measurement of electrochemical redox activity of IgM and IgG antibodies specific to the SARS-CoV-2 Spike Glycoprotein (S1). The S1 protein has a Receptor Binding Domain (RBD) which latches on to the ACE2 receptors on the host cells before infection. Hence, antibody tests targeting the S1 spike protein are more representative of immune response against infection compared to those that target the Nucleocapsid (N) protein. PathShodh's technique, which is protected through US and Indian patent applications, is also a major departure from the qualitative rapid antibody tests in the market, which are primarily based on the lateral flow ELISA technique.

This test has been developed by leveraging PathShodh's Lab-on-Palm platform "anuPathTM", which interfaces with disposable test strips functionalised with an immunoreceptor specific to COVID-19 antibodies. The results are automatically displayed by the handheld reader. Therefore, there are no subjective errors due to manual readout of test results, as in the current lateral flow assay test kits. The other unique features of this technology include on-board memory

to store more than 1 lakh real-time test results, touch screen display, rechargeable battery, Bluetooth connectivity to smart phone and cloud storage, capabilities to map the patient data to Aadhar number and the possibility of connecting test data through APIs to Aarogya Setu.

According to Vinay Kumar, CEO and co-founder of PathShodh, "This novel technology can detect COVID-19 antibodies all the way down to the nanomolar concentration. It can work with venous or capillary (finger-prick) whole blood sample as well as serum sample. We plan to deploy the product in the market in the next couple of weeks. PathShodh's current production capacity is about 1 lakh tests per month, and we can scale this up further by augmenting the manufacturing infrastructure."

The funds for developing and commercialising this technology were provided by the DST, under its initiative on Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH). The technology development was also supported by SINE at IIT Bombay and IKP Knowledge Park, Hyderabad. The Society for Innovation and Development at IISc provided the seed funding for this development.

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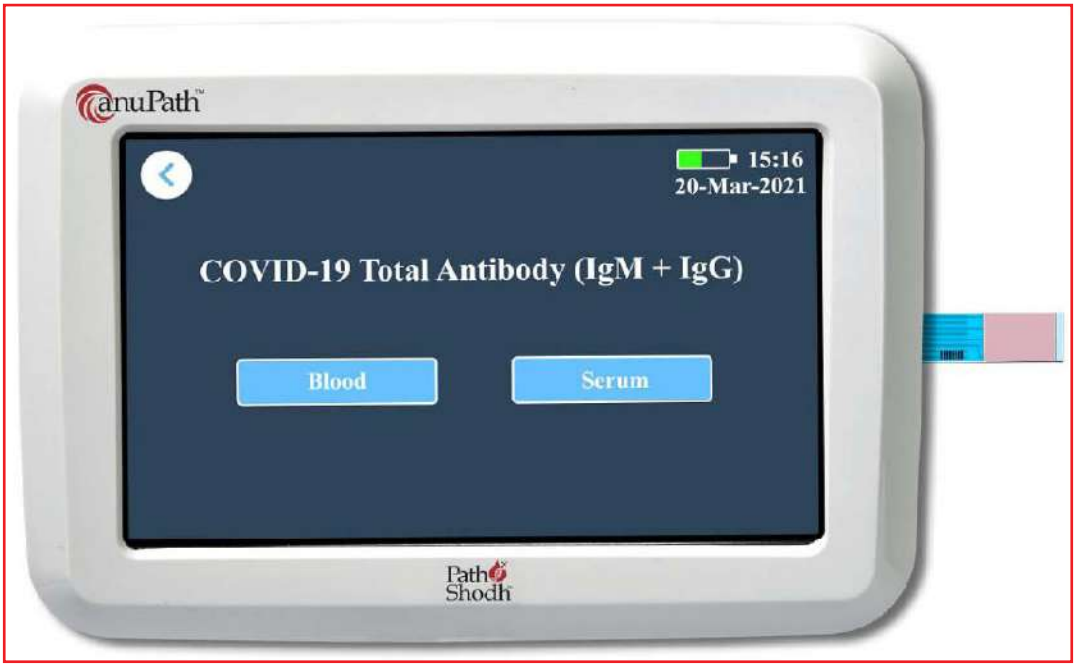

Website link:
https://www.iisc.ac.in/events/iisc-start-up-pathshodh-gets-regulatory-approvals-for-covid-19-test/

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RESEARCH SUPPORTS

The scientific approach has driven the ways the country is mitigating the pandemic. Here is an effort to sew up the significant contributions made by STI communities. The information is most suitable for the research fraternity, for whom the contact information is also provided to communicate further and up-skill the research.

RESEARCH SUPPORTS

Adhatoda Vasica attenuates inflammatory and hypoxic responses in preclinical mouse models: Potential for repurposing in COVID-19-like conditions

COVID-19 pneumonia has been associated with severe acute hypoxia, sepsis-like states, thrombosis and chronic sequelae including persisting hypoxia and fibrosis. The molecular hypoxia response pathway has been associated with such pathologies and a recent observations on anti-hypoxic and anti-inflammatory effects of whole aqueous extract of *Adhatoda Vasica* (AV) prompted the researchers to explore its effects on relevant preclinical mouse models.

In this study, they tested the effect of whole aqueous extract of AV in murine models of bleomycin-induced pulmonary fibrosis, Cecum Ligation and Puncture (CLP)-induced sepsis, and siRNA-induced hypoxia-thrombosis phenotype. The effect on lung of AV-treated naïve mice was also studied at transcriptome level and also determined if the extract may have any direct effect on SARS-CoV-2 replication.

Oral administration AV extract attenuates increased airway inflammation, levels of transforming growth factor-b1 (TGF-b1), IL-6, HIF-1α and improves the overall survival rates of mice in the models of pulmonary fibrosis and sepsis and rescues the siRNA-induced inflammation and associated blood coagulation phenotypes in mice and also observed downregulation of hypoxia, inflammation, TGF-b1, and angiogenesis genes and upregulation of adaptive immunity-related genes in the lung transcriptome. AV treatment also reduced the viral load in Vero cells infected with SARS-CoV-2.

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Website link:
https://www.ccmb.res.in/Research/Research-Publications
https://www.researchsquare.com/article/rs-105233/v2

Cancer vs. SARS-CoV-2-induced inflammation: Study suggests overlapping functions and pharmacological targeting

Inflammation is an intrinsic defence mechanism triggered by the immune system against infection or injury. Chronic inflammation allows the host to recover or adapt through cellular and humoral responses, whereas acute inflammation leads to cytokine storms resulting in tissue damage. In a review, the researchers presented the overlapping outcomes of cancer inflammation with virus-induced inflammation. The study emphasises how anti-inflammatory drugs that work against cancer inflammation may work against the inflammation caused by the viral infection. It is established that the cytokine storm induced in response to SARS-CoV-2

infection contributes to disease-associated mortality. While cancer remains the second among the diseases associated with mortality worldwide, cancer patients' mortality rates are often observed upon extended periods after illness, usually ranging from months to years. However, the mortality rates associated with COVID-19 disease are robust. The cytokine storm induced by SARS-CoV-2 infection appeared to be responsible for the multi-organ failure and increased mortality rates. Since both cancer and COVID-19 disease share overlapping inflammatory mechanisms, repurposing some anticancer and anti-inflammatory drugs for COVID-19 may lower mortality rates. Here, they review some of these inflammatory mechanisms and propose some potential chemotherapeutic agents to intervene in them and also discuss the repercussions of anti-inflammatory drugs such as glucocorticoids and hydroxychloroquine with zinc or antiviral drugs such as ivermectin and remdesivir against SARS-CoV-2-induced cytokine storm. In this review, the researchers emphasise on various possibilities to reduce SARS-CoV-2-induced cytokine storm.

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Website link:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7959277/
https://www.ccmb.res.in/Research/Research-Publications

HARIOM, an optical detection method for COVID-19

In order to define public health policies, simple, inexpensive, and robust detection methods for SARS-CoV-2 are vital for mass-testing in resource-limited settings. The current choice of molecular methods for identification of SARS-CoV-2 infection includes nucleic acid-based testing (NAT) for viral genetic material and antigen-based testing for viral protein identification. Host exposure is detected using antibody detection assays. While NATs require sophisticated instrument and trained manpower, antigen tests are plagued by their low sensitivity and specificity. Thus, a test offering sensitive detection for presence of infection as a colorimetric readout holds promise to enable mass testing in resource-constrained environments by minimally trained personnel.

The novel HRPZyme Assisted Recognition of Infection by Optical Measurement (HARIOM) assay combines specificity of NATs with sensitivity of enzymatic assays resulting in enhanced signal-to-noise ratios in an easily interpretable colorimetric readout. Using this assay, the researchers could detect up to 102 copies of synthetic viral RNA spiked in saliva as a detection matrix. Validating their assay on suspected human subjects, they found concordance with PCR-based readouts with visible colorimetric distinction between positive and negative samples in less than an hour. This assay holds the potential to aid in mass screening to detect SARS-CoV-2 infection by facilitating colorimetric detection with minimal resources and trained personnel.

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Website link:
https://www.sciencedirect.com/science/article/pii/S0956566321003171

Computational analysis and phylogenetic clustering of SARS-CoV-2 genomes

Following the rapid human-to-human transmission of the infection, institutes around the world have made efforts to generate genome sequence data for the virus. With thousands of genome sequences for SARS-CoV-2 now available in the public domain, it is possible to analyze the

sequences and gain a deeper understanding of the disease, its origin, and its epidemiology. Phylogenetic analysis is a potentially powerful tool for tracking the transmission pattern of the virus with a view to aiding identification of potential interventions. Toward this goal, a comprehensive protocol has been created for the analysis and phylogenetic clustering of SARS-CoV-2 genomes using Nextstrain, a powerful open-source tool for the real-time interactive visualization of genome sequencing data. Approaches to focus the phylogenetic clustering analysis on a particular region of interest are detailed in this protocol.

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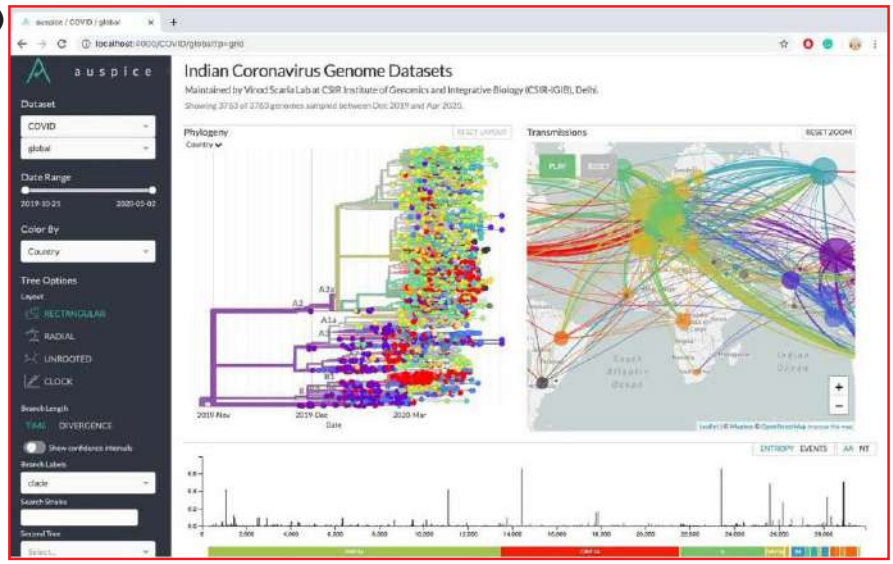

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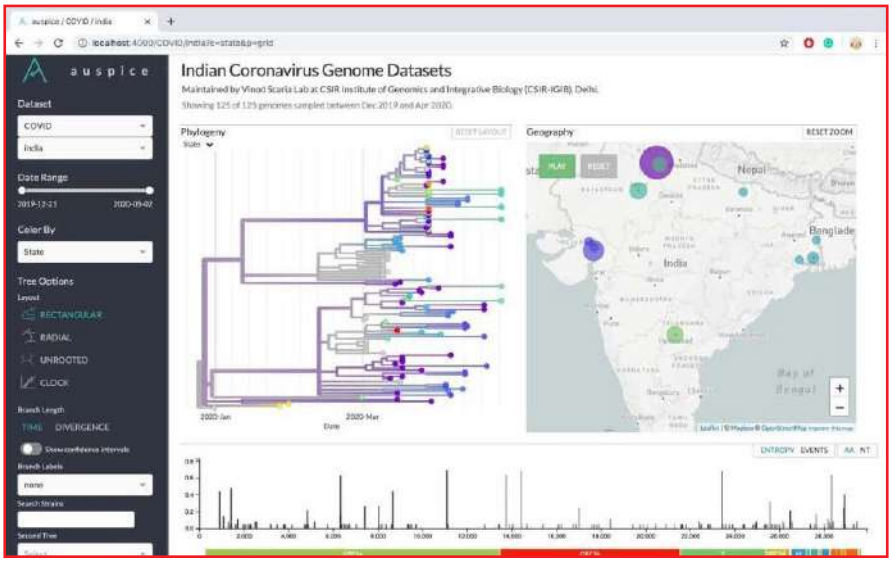

Website link:
https://bio-protocol.org/e3999

After FELUDA, CSIR develops paper test RAY to identify COVID-19 virus variants within an hour

The Council of Scientific & Industrial Research (CSIR) has developed a new COVID-19 test that can identify the variant of the virus identified in the United Kingdom within an hour. The new test is called RAY (Rapid variant AssaY), in an homage to legendary Bengali filmmaker and author Satyajit

Ray. It has been created by the same CSIR team that in April last year designed 'FELUDA', a paper-based COVID-19 test named after the fictional detective that Ray had created.

The RAY test has been developed at a time when countries across the world are actively scrutinising international travellers for new variants of the COVID-19 virus, such as the variant identified in the UK, which spreads faster than the original SARS-CoV-2 variant.

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Website link:
https://www.csir.res.in/slider/after-feluda-csir-develops-paper-test-%E2%80%98ray%E2%80%99-identify-covid-variants-within-hour

Studies on immunological, nutritional and comorbidity factors impacting response to infection and vaccination – an initiative funded by Office of the PSA

Since the beginning of the COVID-19 pandemic, Pune has been one of the worst hit cities in the world. The total number of Coronavirus-positive patients to date (as on 9 May 2021) has reached 4,46,564 out of which 4,05,474 have been cured while 7358 have died. There are still 33,732 active patients undergoing treatment in various hospitals. Pune has, thus, been hit incredibly hard by the pandemic. During the beginning of the pandemic, Pune city, managed by Pune Municipal Corporation (PMC), successfully initiated and maintained Government mandated data compilation from clinic and hospital-level data at the city level. The PMC and Pune Knowledge Cluster (PKC) entered into a collaborative agreement in April 2020 to develop and implement local policies based on the analysis of the COVID-19 patient-level data. The major activities of this collaboration included curation of the data, analysis of data at sub-region level called Prabhags, modelling of the data to project the pandemic curve, constitution of a project to assess the prevalence of positive serology among the population and coordination for resource procurements and allocation.

The PKC (www.pkc.org.in) is funded by the cluster initiative of the office of the Principal Scientific Adviser to the Government of India. The studies outlined here, however, can easily be scaled up across various regions of the country, which will generate public health data of enormous value for immediate policy decisions to address the current pandemic and also for the future.

Differences in the scale of the infection spread and severity of the clinical outcomes of infection highlight the importance of framing polices and strategies to fight the pandemic, both in the short-term and the long-term, based on ground level data and scientific investigations of the infectivity of the virus and immune response of infected people. Detailed studies on both the viral pathogen and host factors are key to understand and control the pandemic, prevent loss of lives, and reduce long-term health impact. Viral genome sequencing as the infection spreads across diverse human populations and as they are vaccinated and immunotyping of populations based on immune response to infection and vaccination need to be taken up immediately on war-footing. In addition, factors such as nutritional diversity among the populations and other comorbidities that impact the risks of severe disease need to be studied in more detail. Such studies have minimal epidemiological and public health value unless they are designed based on ground level granular data on the pandemic since its beginning.

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Genomic surveillance of SARS-CoV-2 using wastewater in Bengaluru city – an initiative supported by Office of PSA

Bangalore Water Supply and Sewerage Board (BWSSB) manages wastewater systems through more than 25 Sewage Treatment Plants (STPs) and supplies treated water for irrigation, industrial use, and recharging of urban lakes (https://www.bwssb.gov.in). National Centre for Biological Sciences (NCBS) is currently engaging with BWSSB for a regular sampling of non-treated, treated, and sludge samples from different STPs. These samples are to be tested for SARS-CoV-2 RNAs using standard qRT-PCR and also to be used for standardizing and optimizing other novel methods. A formal Memorandum of Understanding is in place between NCBS and BWSSB to perform the abovementioned activities.

Wastewater epidemiology is a powerful tool to understand the dynamics of not just SARS CoV-2 but many other emerging pathogens. In addition to detecting the SARS-CoV-2 genome, this study would identify variants circulating in the populations. The repeated sampling at regular intervals would help track emerging variants and their dynamics over time. This information can be correlated with the clinical data from the catchment area. Besides, prevalence information would actively be used as an indicator of infection load and the health status of the catchment area population. By actively engaging with BWSSB, NCBS hopes to build capacity at BWSSB to implement wastewater epidemiology for public health purposes. This collaborative effort would strengthen the knowledge on the impact of COVID-19 in the city and build the capabilities of both institutions - BWSSB and NCBS- to understand and manage wastewater in Bengaluru city better.

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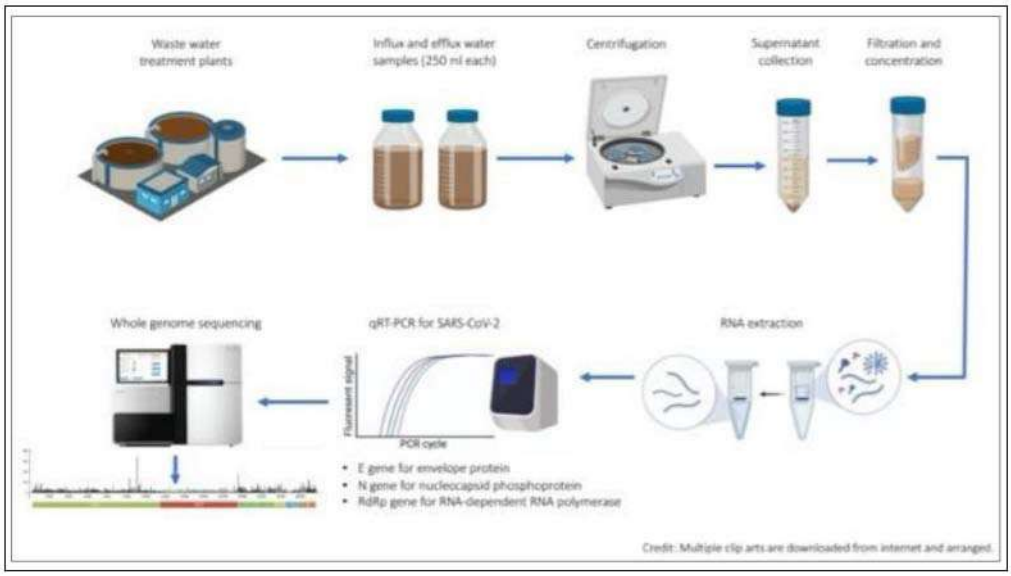

Envisaged workflow of wastewater sample collection, processing, and whole genome sequencing

Rapid response in a pandemic through genomic surveillance of SARS-CoV-2 genomes – an initiative supported by Office of PSA

SARS-CoV-2 is the coronavirus that causes COVID-19, a pandemic that has gripped the entire world since November 2019. Several countries throughout the world have been through waves and troughs of infection. Through these difficult times, science-based response remains at the forefront of what we can do. The aim is to work at this science-based pandemic response interface. Genomic surveillance of the virus as it evolves and changes are critical for vaccine calibration due to the generation of variants. Such surveillance remains poor in India, despite interest and some level

of national investment in such an endeavour. This is particularly true in the context of vaccination. While vaccine breakthrough is now recognized as most significant, the genomic characteristics of the viras that allows it to breakthrough depend on adequate genomic surveillance. The proposal address the genomics and immunology of vaccine breakthrough, correlated with disease severity in multiple geographies in India -- Vellore in Tamil Nadu and Bengaluru in Karnataka -- by creating and building on existing infrastructure and cohorts set up during this on-going pandemic. This will be coordinated and executed by some of the best hospitals (CMC, Vellore; Baptist Hospital and St Johns Research institute) and most accomplished institutes like DBT's inStem and TIFR-NCBS in the country.

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A pan-national effort on enhanced viral surveillance to better track COVID-19 and vaccinations in India: The second wave and beyond – an initiative supported by Office of PSA

Pathogens like viruses have short generation times and high reproductive rates. This allows them to evolve or change very rapidly. SARS-CoV-2, the virus responsible for the on-going pandemic of COVID-19, mutates and changes continuously as it transmits from person to person. While most new mutations or changes are of little to no consequence, others are able to transmit better, escape existing immunity, dodge detection by diagnostic kits, or have serious clinical impacts. Continuous and on-going genome sequencing of the virus and genomic surveillance help better understand how SARS-CoV-2 is evolving. Such sequencing will eventually allow us to mitigate the risks posed by the ever-changing genomic landscape of the virus, particularly making course correction to vaccination strategies. Furthermore, genomics coupled with host serum analyses can help to explain why people respond to COVID-19 in different ways, therefore helping to identify and better protect those at greater risk of severe disease.

Genomic surveillance for both retrospective and prospective (future infections), when coupled with clinical data, allow us to infer correlations between viral mutations and patient outcomes. All centres will work with their respective states and clinical partners, who have access to epidemiological clinical data on disease outcomes. Such analyses will allow understanding the role of virus evolution in disease burden. Patient genomics can help identify individual-specific responses and correlates.

From a practical perspective, the only way forward is vaccination. Vaccine breakthrough, when vaccinated people get infected, is now recognized as significant. The genomic characteristics of the virus that allow it to breakthrough also require adequate genomic surveillance.

Objectives:

1. Retrospective genomic surveillance: Genome sequencing of archived samples representing dynamics of the pandemic (high vs. low incidence zones; asymptomatic/mild vs. severe symptoms/mortality; paediatric/young age vs. old age infections etc.).

2. Prospective genomic surveillance: Genome sequencing to i) track variant emergence and transmission using sampling strategies defined by sociodemographics; ii) reconstruct epidemiologic history using both phylogenetic analysis and gene genealogy; iii) characterize and draw inferences from clinical phenotypes including vaccine breakthroughs, re-infections, and others; and iv) conduct environmental surveillance (of sewage and waste water), potential to complement human surveillance and support of early interventions (considering large proportion of infected people are asymptomatic).

3. Build human resource: Bioinformatics and genomic epidemiology training for pathogen genomics across institutions and platforms. Adopt evolving technology for sequencing,

analyses and rapid identification of viral variants, build workflows, use of pipelines, quality checks, data validation and approaches to rapid/real-time data sharing.

4. Applied science: Use of sequencing data to inform and support evaluations relevant to public health, vaccines, drug development and clinical prediction.

Partners, such as Pune Knowledge Cluster (coordinator representing CSIR-NCL, IISER Pune, SPPU, NCCS, BJMC, AFMC, KEM and Symbiosis Hospitals), CCMB, NCBS, InStem, St. Johns hospital, Baptist Hospital, NIMHANS, Bangalore Water Supply and Sewage Board, and CMC Vellore are among those whose objectives of success include the well-being and health of the greater populace.

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Full-genome sequences of the first two SARS-CoV-2 viruses from India by ICMR-NIV, Pune

SARS-CoV-2 has globally affected 195 countries. In India, suspected cases were screened for SARS-CoV-2 as per the advisory of the Ministry of Health and Family Welfare. Predicted linear B-cell epitopes were found to be concentrated in the S1 domain of spike protein, and a conformational epitope was identified in the receptor-binding domain. The predicted T-cell epitopes showed broad human leucocyte antigen allele coverage of A and B supertypes predominant in the Indian population.

The two SARS-CoV-2 sequences obtained from India represent two different introductions into the country. The genetic heterogeneity is as noted globally. The identified B- and T-cell epitopes may be considered suitable for future experiments towards the design of vaccines and diagnostics. Continuous monitoring and analysis of the sequences of new cases from India and the other affected countries would be vital to understand the genetic evolution and rates of substitution of the SARS-CoV-2.

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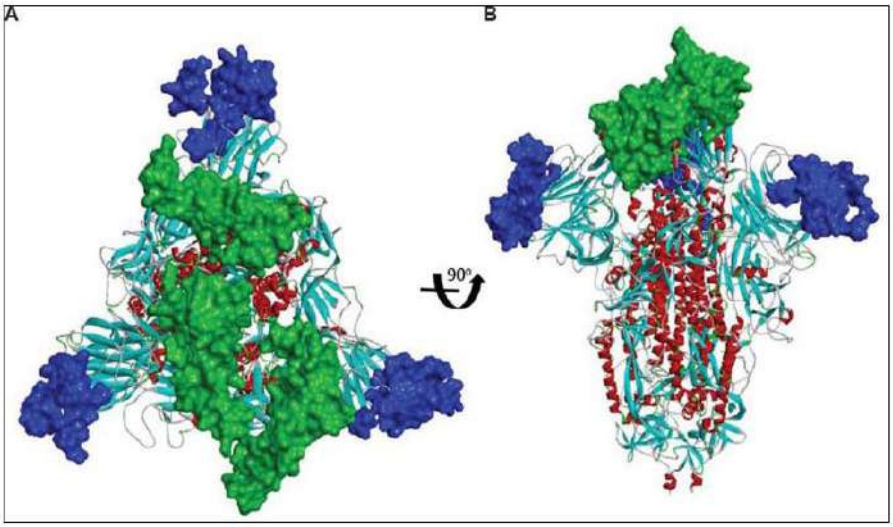

Predicted conformational B-cell epitopes mapped on the pre-fusion structure

Website link:
https://pubmed.ncbi.nlm.nih.gov/32242873/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7258756/

A review vaccines and therapies in development for SARS-CoV-2 infections

The current COVID-19 pandemic is caused by the novel coronavirus SARS-CoV-2. The virus causes severe respiratory symptoms which manifest disproportionately in the elderly. Given the current severity of the outbreak, there is a great need for antiviral therapies and vaccines to treat and prevent COVID-19.

Given the current lack of treatments for SARS-CoV-2, there is a great demand to produce and scale therapeutics and vaccines to combat COVID-19. Before the current outbreak, there was not even a standardized treatment for the original SARS-CoV infections. Research and development are critically needed to protect against SARS-CoV-2 and future coronaviruses infections. In a review, researchers from ICMR-National Institute of Virology (NIV) and other international institutes have discussed the epidemiology and structure of the novel coronavirus. They also discussed two promising vaccine and three therapeutic treatments in development along with two experimental therapies that should be further investigated. If these treatments can be successfully developed and scaled, the length and severity of the COVID-19 outbreak could potentially be attenuated. Until then, social distancing and maintaining effective sanitization remain good tools for the public.

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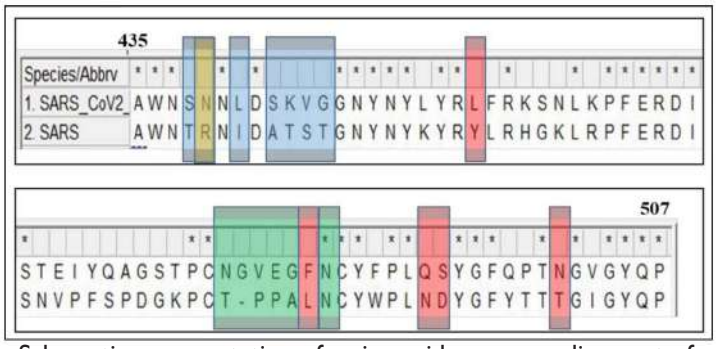
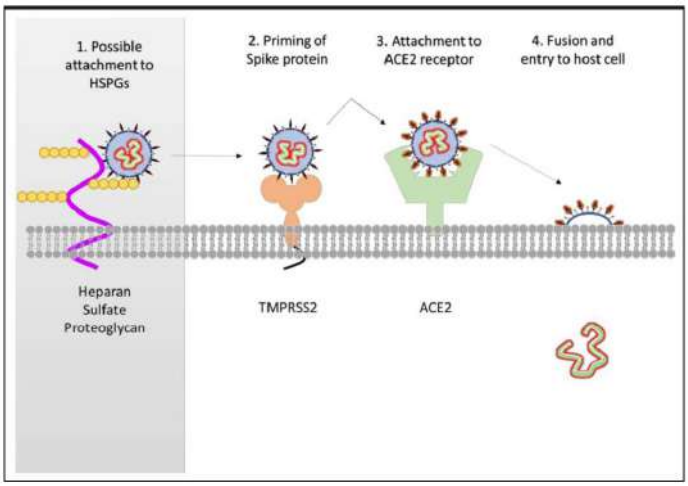


Schematic representation of amino acid sequence alignment of the receptor binding domain (RBD) of the spike glycoproteins of SARS-CoV and SARS-CoV-2



Overview of attachment and entry of SARS-CoV-2

Website link:
https://www.mdpi.com/2077-0383/9/6/1885

Research contributions through publications by ICMR-NIV on COVID-19

National Institute of Virology (ICMR-NIV) printed research publications on COVID-19 to reach out to the people. These publications had details about effects of Coronavirus and COVID-19 on the human body. There are forty publication/research papers that were published during the pandemic which focuses on the following:

1) Genetic characterization of SARS-CoV-2 & implications for epidemiology, diagnostics & vaccines in India.
2) PLACID Trial Collaborators. Convalescent plasma in the management of moderate covid-19 in adults in India: open label phase II multicentre randomised controlled trial (PLACID Trial)
3) Guidance for building a dedicated health facility to contain the spread of the 2019 novel coronavirus outbreak.
4) Evaluation of RdRp & ORF-1b-nsp14-based real-time RT-PCR assays for confirmation of SARS-CoV-2 infection: An observational study.
5) Utility of a modified heat inactivation method for direct detection of SARS-CoV-2 by RT-qPCR in viral transport medium bypassing RNA extraction: A preliminary study.
6) Performance evaluation of Truenat Beta CoV & Truenat SARS-CoV-2 point-of-care assays for coronavirus disease 2019.
7) Lessons learnt during the first 100 days of COVID-19 pandemic in India.
8) The enigmatic COVID-19 pandemic.
9) Time to revisit national response to pandemics.
10) Perspectives for repurposing drugs for the coronavirus disease 2019.
11) Development of in vitro transcribed RNA as positive control for laboratory diagnosis of SARS-CoV-2 in India.
12) Neutralizing antibody responses to SARS-CoV-2 in COVID-19 patients.
13) Safety and immunogenicity of an inactivated SARS-CoV-2 vaccine, BBV152: a double-blind, randomised, phase 1 trial.
14) Laboratory preparedness for SARS-CoV-2 testing in India: Harnessing a network of Virus Research & Diagnostic Laboratories.
15) Laboratory surveillance for SARS-CoV-2 in India: Performance of testing & descriptive epidemiology of detected COVID-19
16) Identification of SARS-CoV-2 clusters from symptomatic cases in India.
17) Inactivation of SARS-CoV-2 by gamma irradiation.
18) How artificial intelligence may help the Covid-19 pandemic: Pitfalls and lessons for the future.
19) Evaluation of the susceptibility of mice & hamsters to SARS-CoV-2 infection.
20) Immunogenicity and protective efficacy of BBV152, whole virion inactivated SARS-CoV-2 vaccine candidates in the Syrian hamster model.
21) Biorisk assessment for infrastructure & biosafety requirements for the laboratories providing coronavirus SARS-CoV-2/(COVID-19) diagnosis.
22) Comparison of the immunogenicity & protective efficacy of various SARS-CoV-2 vaccine candidates in non-human primates.

23) SARS-CoV-2 & influenza A virus co-infection in an elderly patient with pneumonia.

24) Prevalence of SARS-CoV-2 infection in India: Findings from the national serosurvey.

25) Transcriptome & viral growth analysis of SARS-CoV-2-infected Vero CCL-81 cells.

26) Natural Selection Plays an Important Role in Shaping the Codon Usage of Structural Genes of the Viruses Belonging to the Coronaviridae Family.

27) Quasispecies analysis of the SARS-CoV-2 from representative clinical samples: A preliminary analysis.

28) Prediction of potential small interfering RNA molecules for silencing of the spike gene of SARS-CoV-2.

29) Steps, implementation and importance of quality management in diagnostic laboratories with special emphasis on coronavirus disease-2019.

30) Genomic analysis of SARS-CoV-2 strains among Indians returning from Italy, Iran & China, & Italian tourists in India.

31) Respiratory virus detection among the overseas returnees during the early phase of COVID-19 pandemic in India.

32) Pooled testing for COVID-19 diagnosis by real-time RT-PCR: A multi-site comparative evaluation of 5- & 10-sample pooling.

33) Transmission electron microscopy imaging of SARS-CoV-2.

34) Development of indigenous IgG ELISA for the detection of anti-SARS-CoV-2 IgG.

35) First isolation of SARS-CoV-2 from clinical samples in India.

36) SARS-CoV-2 detection in sewage samples: Standardization of method & preliminary observations.

37) Vaccines and Therapies in Development for SARS-CoV-2 Infections.

38) Isolation and characterization of VUI-202012/01, a SARS-CoV-2 variant in travellers from the United Kingdom to India.

39) Full-genome sequences of the first two SARS-CoV-2 viruses from India.

40) Detection of coronaviruses in Pteropus & Rousettus species of bats from different States of India.

Website link:
https://niv.co.in/COVID_19_publications_%20from_ICMR_NIV%20.pdf

SARS-CoV-2: Phylogenetic origins, pathogenesis, modes of transmission, and the potential role of nanotechnology

The COVID-19 pandemic has elicited a rapid response from the scientific community with significant advances in understanding the causative pathogen (SARS-CoV-2). Mechanisms of viral transmission and pathogenesis as well as the structural and genomic details have been reported, which are essential in guiding containment, treatment, and vaccine development efforts.

The present paper is a concise review of the recent research in these domains and an exhaustive analysis of the genomic origins of SARS-CoV-2. Particular emphasis has been placed on the pathology and disease progression of COVID-19 as documented by recent clinical studies, in addition to the characteristic immune responses involved therein. Furthermore, the potential of nanomaterial and nanotechnology to develop diagnostic tools, drug delivery systems, and personal protective equipment design within the on-going pandemic context have also been

discussed and the paper is going to be a ready resource for researchers to gain succinct, up-to-date insights on SARS-CoV-2.

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Website link:
https://pubmed.ncbi.nlm.nih.gov/33644261/

IISER Bhopal's research shows coronavirus 'N protein' plays critical role in viral transmission

Researchers from the Indian Institute of Science Education and Research (IISER), Bhopal have shown that proteins from the COVID-19 virus other than the well-known 'spike protein' can play a critical role in the infectivity of the virus.

The establishment of SARS CoV-2 spike-pseudotyped lentiviral (LV) systems have enabled the rapid identification of entry inhibitors and neutralizing agents, alongside allowing for the study of this emerging pathogen in BSL-2 level facilities. While such frameworks recapitulate the cellular entry process in ACE2+ cells, they are largely unable to factor in supplemental contributions by other SARS-CoV-2 genes.

To address this, researchers from IISER, Bhopal performed an unbiased open reading frame (ORF) screen and identified the nucleoprotein (N) as a potent enhancer of spike-pseudotyped LV particle infectivity and further demonstrate that this augmentation by N renders LV spike particles less vulnerable to the neutralizing effects of a human IgG-Fc-fused ACE2 microbody.

Biochemical analysis revealed that the spike protein is better enriched in virions when the particles are produced in the presence of SARS-CoV-2 nucleoprotein. Importantly, this improvement in infectivity is achieved without a concomitant increase in sensitivity towards RBD binding-based neutralization. The results hold important implications for the design and interpretation of similar LV pseudotyping-based studies.

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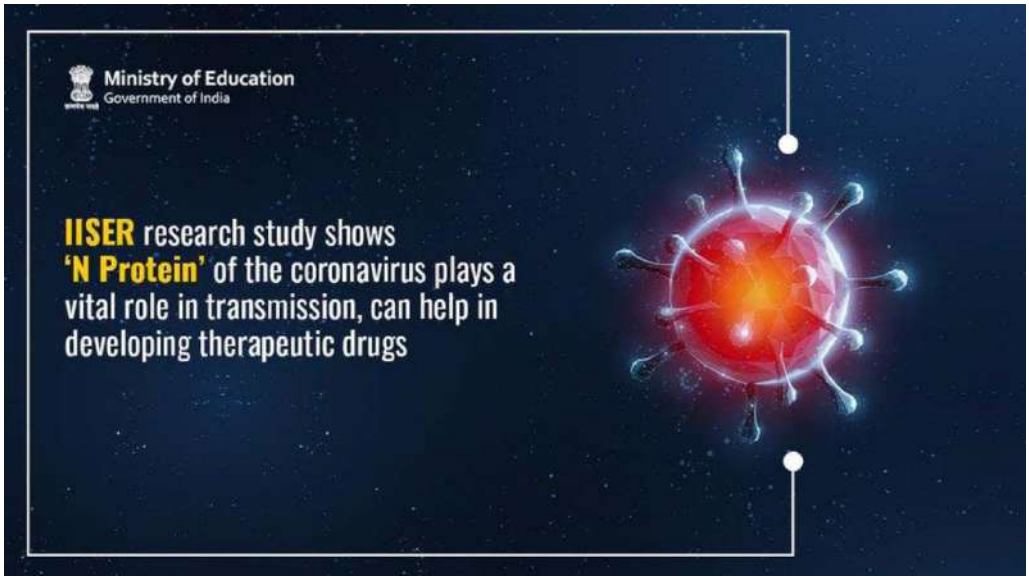

Website link:
https://www.biorxiv.org/content/10.1101/2021.02.11.430757v1

Protective roles of flu infections and BCG vaccination in lowering COVID-19 mortality

The recent COVID-19 pandemic has caused a great loss of lives as well as affected economies in several countries. The loss of COVID-19 deaths is far greater in some countries compared to others. This observation led to perform epidemiological analysis using disease and vaccination data in the public domain with respect to measles, hepatitis B virus, polio, tuberculosis, and flu from twenty five countries across the globe. There is no correlation between COVID-19 incidences or deaths as well as vaccination coverage with respect to diseases such as measles, hepatitis B virus, and polio.

However, countries with lower cases of tuberculosis and higher cases of flu have a significant correlation with respect to COVID-19 deaths. In fact, countries with high BCG vaccination coverage show a significant negative correlation with COVID-19 deaths. Surprisingly, countries such as the USA, Italy, France and Spain which have flu vaccination, but not BCG vaccination, show maximum number of COVID-19 deaths. It appears that high numbers of flu infections are protective and can decrease the number of COVID-19 deaths. Importantly, countries with high flu cases and BCG vaccination, such as India, Egypt, South Africa etc., show relatively lower COVID-19 deaths, reinforcing the protective roles of BCG vaccination. Notably, these general trends are statistically significant for COVID-19 deaths but not COVID-19 incidences. The implications of results are discussed with respect to the roles of microbial infections in the respiratory tract, vaccinations, and other factors in lowering COVID-19 deaths.

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Website link:
https://covid19.iisc.ac.in/protective-roles-of-flu-infections-and-bcg-vaccination-in-lowering-covid-19-mortality-preprint-study/

Mechanistic modelling of the SARS-CoV-2 and immune system interplay unravels design principles for diverse clinico-pathological outcomes

The disease caused by SARS-CoV-2 is a global pandemic that threatens to bring long-term changes worldwide. Approximately 80% of the infected patients are asymptomatic or have mild symptoms such as fever or cough, while rest of the patients have varying degrees of severity of symptoms, with 3-4% mortality rate. Severe symptoms such as pneumonia and Acute Respiratory Distress Syndrome can be caused by tissue damage mostly due to aggravated and unresolved innate and adaptive immune response, often resulting from a cytokine storm. However, the mechanistic underpinnings of such responses remain elusive, with an incomplete understanding of how an intricate interplay among infected cells and cells of innate and adaptive immune system can lead to such diverse clinico-pathological outcomes.

A dynamical systems approach to dissect the emergent nonlinear intra-host dynamics among virally infected cells, the immune response to it, and the consequent immunopathology. By mechanistic analysis of cell-cell interactions, key parameters affecting the diverse clinical phenotypes associated with COVID-19 have been identified. This minimalistic yet rigorous model can explain the various phenotypes observed across the clinical spectrum of COVID-19, various co-morbidity risk factors such as age and obesity, and the effect of antiviral drugs on different phenotypes. It also reveals how a fine-tuned balance of infected cell killing and resolution of inflammation can lead to infection clearance, while disruptions can drive different severe

phenotypes. These results will help further the case of rational selection of drug combinations that can effectively balance viral clearance and minimize tissue damage simultaneously.

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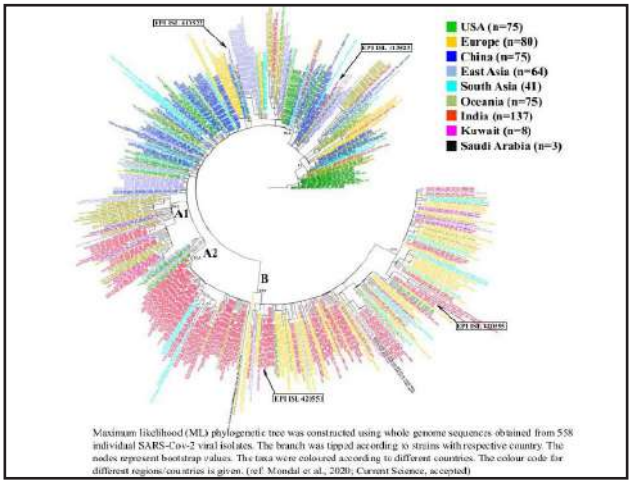
Website link:
https://covid19.iisc.ac.in/mechanistic-modeling-of-the-sars-cov-2-and-immune-system-interplay-preprint-study/

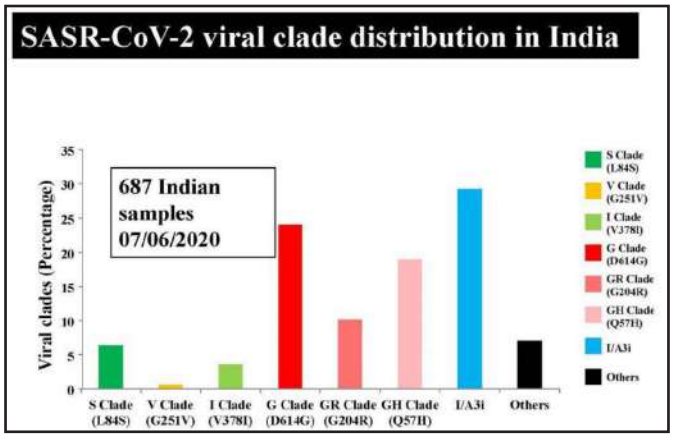
Genomics of Indian SARS-CoV-2: Implications in genetic diversity, possible origin and spread of virus by IISc team

I study has been conducted by the researchers at the Indian Institute of Science, Bangalore that aims to determine the genetic diversity among Indian SARS-CoV-2 viral isolates in comparison to the strains that are occurring worldwide. In addition to identification of types of viral strains in India, it is anticipated that the study will help in understanding the source of virus origin, route of spread, transmission dynamics of the virus, disease severity, possible viral strains for vaccine development, right type of diagnostic kits, and possibly developing relaxation models of social distancing.



Maximum likelihood (ML) phylogenetic tree was constructed using whole genome sequences obtained from 558 individual SARS-Cov-2 viral isolates. The branch was tipped according to strains with respective country. The nodes represent bootstrap values. The taxa were coloured according to different countries. The colour code for different regions/countries is given. (ref: Mondal et al., 2020; Current Science, accepted)

As on 7 June 2020, IISc team has completed analysis of 687 Indian viral genomes and found several interesting findings. The potential origin to be countries mainly from Oceania, Europe, Middle East and South Asia regions, which strongly imply the spread of virus through most travelled countries. Among different clades of the virus as identified by Global Initiative on Sharing All Influenza Data (https://www.gisaid.org/), Indian SARS-CoV-2 viruses are enriched with certain types more than others.



Analysis of the Indian SARS-CoV-2 genomes will continue as more sequences are available. The team will start sequencing of SARS-CoV-2 viruses made available and look forward to finding India-specific genetic variation. The team will also monitor the dynamics of different viral strains over time in India. Efforts are also in progress to find the functional impact of high occurrence non-synonymous mutations on the viral protein functions and use this information towards understanding immune escape mechanism and also developing mutant specific therapies.

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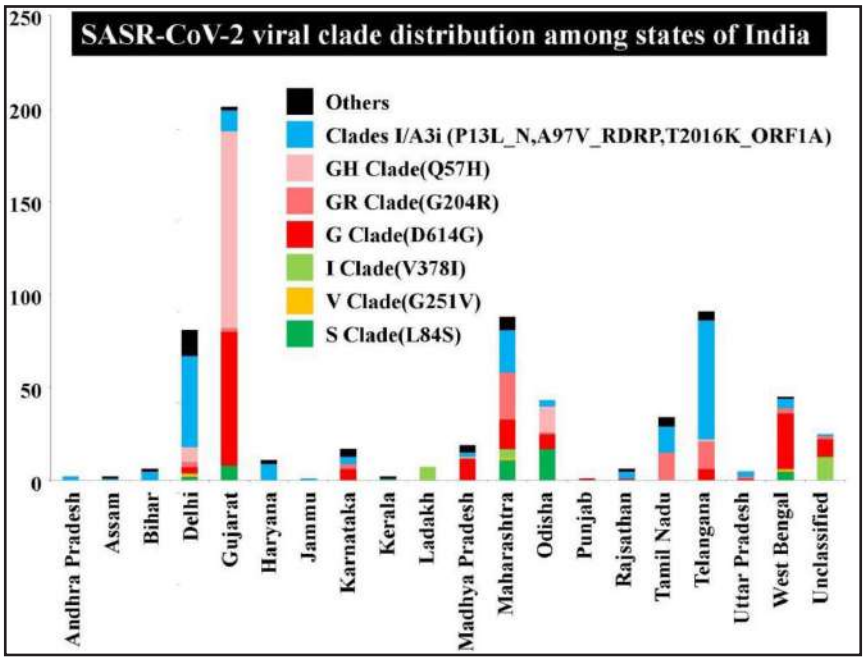

Website link:
https://covid19.iisc.ac.in/functional-genomics-of-indian-sars-cov-2/

Targeting TMPRSS2 and Cathepsin B/L together may be synergistic against SARS-CoV-2 infection

The entry of SARS-CoV-2 into target cells requires the activation of its surface spike protein, S, by host proteases. The host serine protease TMPRSS2 and cysteine proteases Cathepsin B/L can activate S, making two independent entry pathways accessible to SARS-CoV-2. Blocking the proteases prevents SARS-CoV-2 entry in vitro. This blockade may be achieved in vivo through 'repurposing' existing drugs and offers a potential treatment option for COVID-19, currently in clinical trials. The researchers at Indian Institute of Science, Bangalore found that surprisingly drugs targeting the two pathways, although independent, could display strong synergy in blocking virus entry. They predicted this synergy first using a mathematical model of SARS-CoV-2 entry and dynamics in vitro. The model considered the two pathways explicitly, let the entry efficiency through a pathway depend on the corresponding protease expression level, which varied across cells, and let inhibitors compromise the efficiency in a dose-dependent manner. Analysing their model, the researchers showed that the synergy was novel and arose from effects of the drugs at both the single cell and the cell population levels. Validating our predictions, they found that available in vitro data on SARS-CoV-2 and SARS CoV entry displayed this synergy. Exploiting the synergy may improve the deployability of drug combinations targeting host proteases required for SARS-CoV-2 entry.

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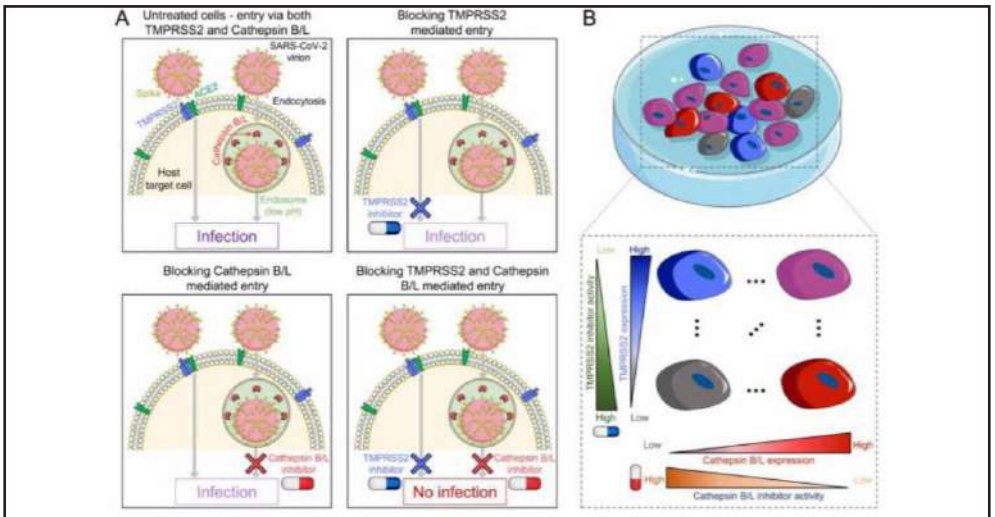

Figure 1. Schematic of the mathematical model incorporating the two independent pathways of SARS-CoV-2 entry into target cells. (A) After the SARS-CoV-2 virion attaches to the host surface receptor ACE2, S protein activation occurs by the host proteases TMPRSS2 (transmembrane) or Cathepsin B/L (endosomal) thus yielding two independent entry pathways. Blocking both pathways is essential for preventing infection of the cell expressing both proteases. **(B)** TMPRSS2 and Cathepsin B/L expression levels vary across cells. The entry efficiency through a pathway increases and the efficacy of the inhibitor at a given concentration decreases with the expression level of the corresponding protease.

Website link:
https://covid19.iisc.ac.in/targeting-tmprss2-and-cathepsinb-l-together-may-be-synergistic-against-sars-cov-2-infection-preprint-study/

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8
COVID COMMUNICATION

The section contains information about various aspects of the COVID-19 pandemic communicated by different reliable media houses, like Press Information Bureau (PIB).

COVID COMMUNICATION

Dr Harsh Vardhan addresses virtual conference on "COVID-19 Pandemic: A Call for Health Security and Peace in the WHO Eastern Mediterranean Region"

19 May 2021, New Delhi

Dr Harsh Vardhan, Union Minister for Health and Family Welfare virtually addressed the conference on "COVID-19 Pandemic: A Call for Health Security and Peace in the WHO Eastern Mediterranean Region" on 19 May 2021.

Remembering the one-year wrath of the novel coronavirus, since, COVID-19 was declared a Public Health Emergency of international concern and reminding everyone that how the pandemic has shown that nobody is safe until all of us are safe, Dr Harsh Vardhan said, "The pandemic has underlined the need for greater collaboration between countries on various aspects of health. Therefore, it is desirable to exchange our experiences, our learnings, our innovations as well as our best practices to help strengthen health systems across the world. We must admit that in such times of global crisis, both risk management and mitigation would require further deepening of global partnerships to re-energize interest and investment in global public health. We also need to conquer the adversary by supplementing each other's capacity by pooling our resources."

Speaking about the importance of collaborative effort in the fight against this deadly virus, the Union Health Minister said, "An important lesson COVID-19 has taught us is that preparedness costs only a fraction of the impact of a pandemic, but the returns on this investment are exponential. This pandemic disrupted life as we knew it, but also provided a steep learning curve for all of us to become more resilient and better prepared for the future. But we must all understand and agree, shared challenges shall only be overcome through shared efforts. No country can prepare or remain safe in silos."

Dr Harsh Vardhan further informed India's pre-emptive, proactive and graded response characterized by the "whole of Government" approach to manage the challenges posed by the COVID-19 pandemic. India's federal structure and subsequent public health system posed various challenges due to the wide diversity that prevails throughout the length and breadth of the country. The Union Health minister highlighted that considering this, India's pandemic management was based on centralized monitoring but decentralized implementation approach. He added that in order to effectively monitor the pandemic, India established a digitally enabled COVID War room at the Central level as well as the State level to increase agility and enhance efforts in our fight against the virus. "One of the most crucial aspects of our fight against COVID-19 was centralized training of frontline health workers and constant dissemination of authenticated information to the masses through various mediums to mitigate the misconceptions around COVID-19 and to spread awareness about COVID-appropriate behaviour", he added.

The Minister highlighted India's response to handling the COVID-19 pandemic in respect to technical innovations related to surveillance, logistic and supply chain management, medical devices and other aspects of clinical management that have been introduced in response to COVID-19 like COVID India Portal, ICMR Portal, RT-PCR app, Facility App, AarogyaSetu App, ITIHAS app, Telemedicine (for COVID and Non-COVID services) etc. To ensure the continuity of health services during the pandemic, a nationwide telemedicine service (eSanjeevani OPD application) was launched and in a short span of 14 months, more than 5 million consultations have been conducted in 28 States of India.

Highlighting the need for vaccination, the Minister said that "Vaccination is an important strategy for disease prevention and plays a critical role in mitigating the impact of a pandemic. India launched the world's largest vaccination drive against COVID-19 on January 16 this year. India has extensively utilized digital technologies for effective implementation of the Co-WIN platform created for inventory management and delivery of COVID-19 vaccine. India has also engaged with various countries bilaterally by providing vaccinations in grants under the humanitarian initiative, Vaccine Maitri. Under this initiative, India has also supplied one lakh vaccine dose to Oman.

The Union Health Minister highlighted that Oman is an important strategic partner of India linked by geography, history and culture and enjoys warm and cordial relations. In the field of healthcare, India and Oman have already established a well-versed mechanism through Joint Working Group.

Dr Harsh Vardhan also pointed out that the exponential increase in urbanisation has not just led to massive non-communicable and communicable diseases but also several other public health threats. He thus emphasized the need for greater collaboration between countries on various aspects of health and stressed for exchange of experience, learning, and innovations as well as best practices to strengthen health systems. He suggested that our programmes must be designed to prepare to work in a world largely shaped and defined by rapidly changing realities, better equipped to face sudden public health threats like pandemics. He finally concluded that India is committed to tirelessly champion the cause "health for all" across the world as we believe the world is one and efforts of further global cooperation must be encouraged.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1720102

Stay Safe from Mucormycosis - A fungal complication being detected in COVID-19 patients

14 May 2021, Mumbai

Even as we try our best to protect ourselves from and cope with COVID-19, there is another threat being posed by a fungus, which we must know and act upon. Mucormycosis, a fungal infection, is being reported in a few COVID-19 patients during or post recovery. As per a statement given by the Health Minister of Maharashtra two days ago, more than 2000 people had already been affected by this fungal infection in the state; 10 people had succumbed to it. Some patients have lost their eyesight.

What causes Mucormycosis?

Mucormycosis or black fungus is a complication caused by fungal infection. People catch mucormycosis by coming in contact with the fungal spores in the environment. It can also develop on the skin after the fungus enters the skin through a cut, scrape, burn, or other type of skin trauma. The disease is being detected among patients who are recovering or have recovered from COVID-19. Moreover, anyone who is diabetic and whose immune system is not functioning well needs to be on guard against this.

How is it related with COVID-19?

The disease is caused by a set of micro-organisms known as mucormycetes, which are present naturally in the environment, seen mostly in soil and in decaying organic matter like leaves, compost and piles.

In normal course, our body's immune system successfully fights such fungal infections. However, we know that COVID-19 affects our immune system. Moreover, the treatment of COVID-19 patients involves intake of drugs like dexamethasone, which suppress our immune system response. Due to these factors, COVID-19 patients face a renewed risk of failing the battle against attacks mounted by organisms such as mucormycetes.

In addition, COVID patients undergoing oxygen therapy in ICU, where humidifier is used, are prone to fungal infection because of exposure to moisture.

But this does not mean that every COVID patient will get infected by Mucormycosis. The disease is uncommon in those not having diabetes but can be fatal if not treated promptly. Chances of recovery depend upon early diagnosis and treatment.

After recovering from COVID-19, one should closely monitor and should not miss any warning signs and symptoms, as the fungal infection is found to emerge even weeks or months after recovery. One should make judicial use of steroids as per doctor's advice to avoid risk of infection. Early detection of the disease can ease the treatment.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718501

DCGI approves clinical trial of Covaxin in children

13 May 2021, New Delhi

The National Regulator of the country, the Drugs Controller General of India (DCGI), after careful examination, has accepted the recommendation of Subject Expert Committee (SEC) and accorded permission to conduct the Phase II/III clinical trial of Covaxin (COVID vaccine) in the age group 2 to 18 years, to its manufacturer Bharat Biotech Ltd on 12.05.2021.

M/s Bharat Biotech International Ltd., Hyderabad (BBIL) had proposed to carry out a Phase II/III clinical trial of Covaxin in the age group of 2 to 18 years. The trial will be conducted in 525 healthy volunteers.

In the trial, the vaccine will be given by intramuscular route in two doses at day 0 and day 28.

As rapid regulatory response, the proposal was deliberated in Subject Expert Committee (SEC) (COVID-19) on 11.05.2021. The Committee after detailed deliberation recommended for grant of permission to conduct proposed Phase II/III clinical trial to certain conditions.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718192

B.1.617 is not an Indian variant of coronavirus, says MoHFW, referred WHO documents

12 May 2021, New Delhi

Several media reports have covered the news of World Health Organisation (WHO) classifying B.1.617 as variant of global concern. Some of these reports have termed the B.1.617 variant of the coronavirus as an "Indian Variant".

Ministry of Health & Family Welfare (MoHFW) refuted various media reports in a press release. These media reports are without any basis and unfounded. This is to clarify that WHO has not associated the term "Indian Variant" with the B.1.617 variant of the coronavirus in its 32 page document. In fact, the word "Indian" has not been used in its report on the matter.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1717876

DCGI approves anti-COVID-19 drug, 2-DG, developed by DRDO for emergency use

8 May 2021, New Delhi

An anti-COVID-19 therapeutic application of the drug 2-deoxy-D-glucose (2-DG) has been developed by Institute of Nuclear Medicine and Allied Sciences (INMAS), a lab of Defence Research and Development Organisation (DRDO), in collaboration with Dr Reddy's Laboratories (DRL), Hyderabad. Clinical trial results have shown that this molecule helps in faster recovery of hospitalised patients and reduces supplemental oxygen dependence. Higher proportion of patients treated with 2-DG showed RT-PCR negative conversion in COVID-19 patients. The drug will be of immense benefit to the people suffering from COVID-19.

In April 2020, during the first wave of the pandemic, INMAS-DRDO scientists conducted laboratory experiments with the help of Centre for Cellular and Molecular Biology (CCMB), Hyderabad and found that this molecule works effectively against SARS-CoV-2 virus and inhibits the viral growth. Based on these results, DCGI, Central Drugs Standard Control Organization (CDSCO) permitted Phase-II clinical trial of 2-DG in COVID-19 patients in May 2020.

The DRDO, along with its industry partner DRL, Hyderabad, started the clinical trials to test the safety and efficacy of the drug in COVID-19 patients. In Phase-II trials (including dose ranging) conducted during May to October 2020, the drug was found to be safe in COVID-19 patients and showed significant improvement in their recovery. Phase IIa was conducted in six hospitals and Phase IIb (dose ranging) clinical trial was conducted at 11 hospitals all over the country. Phase-II trial was conducted on 110 patients.

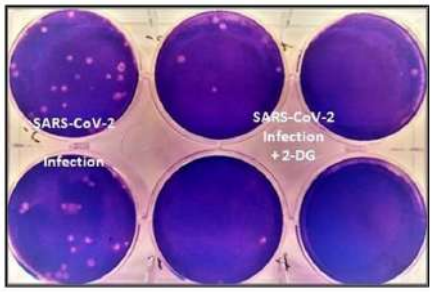
In efficacy trends, the patients treated with 2-DG showed faster symptomatic cure than Standard of Care (SoC) on various endpoints. A significantly favourable trend (2.5 days difference) was seen in terms of the median time to achieving normalisation of specific vital signs parameters when compared to SoC.

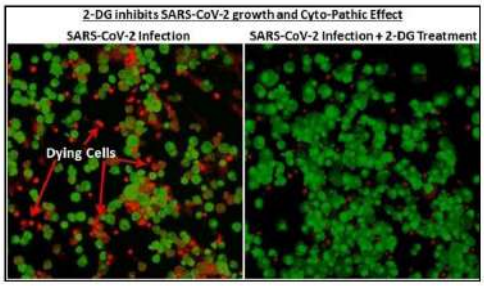
Based on successful results, DCGI further permitted the Phase-III clinical trials in November 2020. The Phase-III clinical trial was conducted on 220 patients between December 2020 to March 2021 at 27 COVID hospitals in Delhi, Uttar Pradesh, West Bengal, Gujarat, Rajasthan, Maharashtra, Andhra Pradesh, Telangana, Karnataka, and Tamil Nadu. The detailed data of phase-III clinical trial was presented to DCGI. In 2-DG arm, significantly higher proportion of patients improved symptomatically and became free from supplemental oxygen dependence (42% vs. 31%) by day-3 in comparison to SoC, indicating an early relief from oxygen therapy/ dependence.

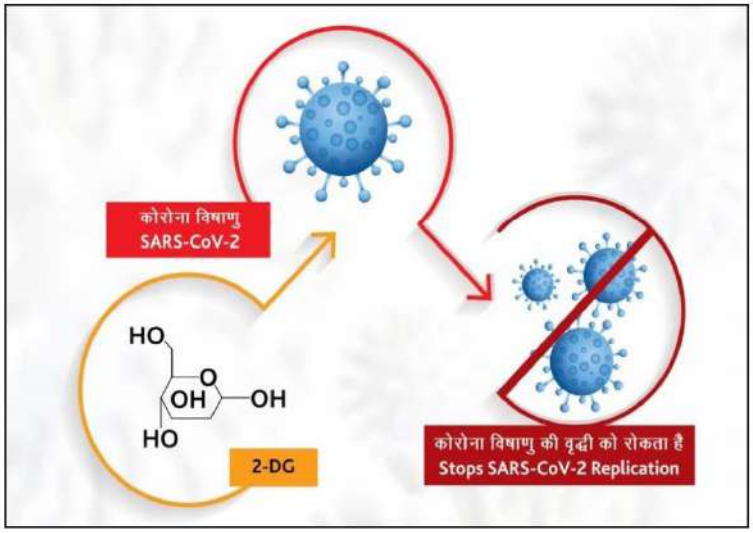
The similar trend was observed in patients aged more than 65 years. On May 01, 2021, DCGI granted permission for emergency use of this drug as adjunct therapy in moderate to severe COVID-19 patients. Being a generic molecule and analogue of glucose, it can be easily produced and made available in plenty in the country.

The drug comes in powder form in sachet, which is taken orally by dissolving it in water. It accumulates in the virus infected cells and prevents virus growth by stopping viral synthesis and energy production. Its selective accumulation in virally infected cells makes this drug unique.

In the on-going second COVID-19 wave, a large number of patients are facing severe oxygen dependency and need hospitalisation. The drug is expected to save precious lives due to the mechanism of operation of the drug in infected cells. This also reduces the hospital stay of COVID-19 patients.







Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1717007

Advisory issued for induction of 8-lakhs trained AYUSH human resources for clinical management of COVID-19

7 May 2021, New Delhi

Continuing with the efforts to augment human resources for the management of COVID-19 cases, the Ministry issued advisory to deploy trained AYUSH human resources available with them for clinical management of COVID-19 cases.

The decision to deploy AYUSH professionals to the frontlines of the COVID-19 war is in continuation of decisions taken a few days back to boost availability of medical personnel to fight COVID-19 such as postponement of the NEET-PG Exam, giving priority to medical personnel completing 100 days of Covid duties in forthcoming regular Government recruitments and deployment of medical interns in Covid Management duties under the supervision of their faculty.

AYUSH doctors are institutionally qualified professionals, well trained in various aspects of medical care. They have already proven their competence in various COVID-19 management roles in different institutions across the country. Some of the institutions under the Ministry of AYUSH like the All India Institute of Ayurveda (AIIA), New Delhi which functions as a COVID -19 Care Centre, are efficiently managing COVID-19 cases at present. Further, States/ UTs have trained nearly 1.06 lakh AYUSH professionals in different aspects of COVID-19 management, and 28,473 professionals have been deployed for COVID-19 activities. Training to AYUSH professionals in different aspects of COVID-19 management was also provided by the Ministry of AYUSH through the Integrated Government Online Training (iGOT) digital platform (https://igot.gov.in/), and 66045 AYUSH professionals completed the same. In addition, the Ministry of AYUSH and the Ministry of Health and Family Welfare have jointly provided training to 33,000 AYUSH master trainers. Thus, a large number of AYUSH professionals have already been prepared through various efforts to take up frontline tasks in the fight against the pandemic. Details of about 8.32 Lakhs of AYUSH manpower have been compiled through the initiatives of the Ministry of AYUSH and provided on the Covid Warriors portal (covidwarriors.gov.in).

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1716918

Government augmenting manufacturing capacity for COVAXIN production under Mission COVID Suraksha

Under Atmanirbhar Bharat 3.0 Mission COVID Suraksha was announced by the Government of India to accelerate the development and production of indigenous COVID-19 vaccines. This is being implemented by Department of Biotechnology, Govt. of India at Biotechnology Industry Research Assistance Council (BIRAC), New Delhi.

As a part of this augmentation plan, capacities of Bharat Biotech Limited, Hyderabad as well as other public sector manufactures are being upgraded with required infrastructure and technology. Financial support is being provided as grant from GoI to the tune of approximately Rs. 65 crore to Bharat Biotech's new Bengaluru facility which is being repurposed to increase the capacity of vaccine production.

The following three public sector companies are also being supported to increase the capacity of vaccine production.

1. Haffkine Biopharmaceutical Corporation Ltd, Mumbai-a State PSE under State Government of Maharashtra.

   Financial support of Rs. 65 Crore as grant from GoI is being provided for this facility to make it ready for manufacturing. The facility will have a capacity of 20 million doses per month, once functional.

2. Indian Immunologicals Limited (IIL), Hyderabad – A facility under National Dairy Development Board is being provided a grant of Rs. 60 crore.

3. Bharat Immunologicals and Biologicals Limited (BIBCOL), Bulandshahr a CPSE under Department of Biotechnology, Government of India is being supported with a grant of Rs. 30 crore to prepare their facility to provide 10-15 million doses per month.

Further, Gujarat Biotechnology Research Centre, Department of Science and Technology, Government of Gujarat along with Hester Biosciences and OmniBRx has also firmed up its discussions with Bharat Biotech to scale up the COVAXIN technology and to produce

minimum 20 million doses per month. Technology transfer agreement has been finalized with all manufacturers.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1718791

Co-WIN digital portal reconfigured to reflect change in dose interval of Covishield vaccine to 12-16 weeks

The COVID Working Group chaired by Dr N K Arora had recommended extension of the gap between the first and second doses of Covishield vaccine to 12-16 weeks. This has been accepted by Government of India on 13 May 2021.

Government of India has communicated this change to States and UTs. The Co-WIN digital portal has also been reconfigured to reflect this extension of interval for two doses of Covishield to 12-16 weeks.

However, there have been reports in a section of the media suggesting that people who had pre-booked their appointment for the second dose in less than 84 days on Co-WIN are being turned back from vaccination centres without getting the second dose of Covishield.

It is clarified that the requisite changes have now been done in the Co-WIN digital portal. As a result, further online or on-site appointments will not be possible if the period after 1st dose date for a beneficiary is less than 84 days.

Additionally, already booked online appointments for 2nd dose of Covishield will remain valid and are not being cancelled by CO-WIN. Further, the beneficiaries are advised to reschedule their appointments for a later date beyond the 84th day from the date of 1st dose vaccination.

The Union Government has reiterated to the States and UTs that the online appointments booked for 2nd dose of Covishield prior to this change of the interval between the two doses of Covishield must be honoured.

The Union Health Ministry has advised the Sates/UTs that the field staff may be instructed that if such beneficiaries do come for vaccination, the second Covishield dose must be administered and they must not be turned away. They have also been advised to undertake awareness activities to inform the beneficiaries about this change.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1719143

Bleeding and clotting events following COVID vaccination miniscule in India

Bleeding and clotting cases following COVID-19 vaccination in India are minuscule and in line with the expected number of diagnoses of these conditions in the country, a report submitted by the National AEFI (Adverse Event Following Immunization) Committee to the Ministry of Health & Family Welfare said.

The AEFI Committee has completed an in-depth case review of 498 serious and severe events, of which 26 cases have been reported to be potential thromboembolic (formation of a clot in a blood vessel that might also break loose and carried by the blood stream to plug another vessel) events – following the administration of Covishield vaccine – with a reporting rate of 0.61 cases/million doses.

There were no potential thromboembolic events reported following administration of Covaxin vaccine. AEFI data in India showed that there is a very miniscule but definitive risk of thromboembolic events. The reporting rate of these events in India is around 0.61/million doses, which is much lower than the 4 cases/million reported by UK's regulator Medical and Health Regulatory Authority (MHRA). Germany has reported 10 events per million doses.

It is important to know that thromboembolic events keep occurring in general population as background and scientific literature suggests that this risk is almost 70 per cent less in persons of South and South East Asian descent in comparison to those from European descent.

Website link:
https://www.pib.gov.in/PressReleasePage.aspx?PRID=1719293

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9
COVID RESOURCES

The efforts made by various agencies and institutions in compiling information and releasing the knowledge products in print or digital form are gathered here for one-point, ready-to-use evidence.

COVID RESOURCES

Office of the PSA releases Advisory on "Stop the Transmission, Crush the Pandemic - Masks, distance, sanitation and ventilation to prevent the spread of SARS-CoV-2 virus"

The Office of the Principal Scientific Adviser to the Government of India has issued a simple, easy-to-follow guideline titled "Stop the Transmission, Crush the Pandemic - Masks, distance, sanitation and ventilation to prevent the spread of SARS-CoV-2 virus". As the pandemic rages in India, it is important to remember that simple tools and practices can reduce the spread of SARS-CoV-2 virus.

The advisory highlights the important role well-ventilated spaces play in diluting the viral load of infected air in poorly ventilated houses, offices etc. Ventilation can decrease the risk of transmission from one infected person to the other.

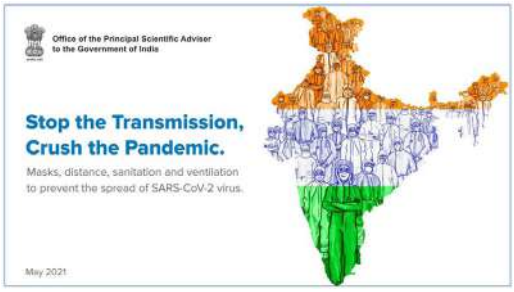
Just as smells can be diluted from the air through opening windows and doors and using exhaust systems, ventilating spaces with improved directional air flow decreases the accumulated viral land in the air, reducing the risk of transmission.

Ventilation is a community defense that protects all of us at home or at work. Introducing outdoor air in offices, homes and larger public spaces is advised. Measures to improve ventilation in these spaces must be taken up on urgent priority in urban and rural areas alike; recommendations for hutments, homes, offices and large centralised buildings are given. Simple strategic placement of fans, open windows and doors, even slightly open windows can introduce outdoor air and improve the air quality inside. Introduction of cross ventilation and exhaust fans will be beneficial in curtailing the spread of the disease.

In buildings with central air management systems improving central air filtration/increased filtration efficiency is especially helpful when enhanced outdoor air delivery options are limited. In offices, auditoriums, shopping malls etc. use of gable fan systems and roof ventilators are recommended. Frequent cleaning and replacement of filters is highly recommended.

Saliva and nasal discharged in the form of droplets and aerosols, by an infected person while exhaling, talking, speaking, singing, laughing, coughing or sneezing etc. is the primary mode of virus transmissions. Infected person who shows no symptoms also transmits the virus. People without symptoms can spread the virus. People should continue wearing a mask, wear double masks or an N95 mask.

The SARS-CoV-2 virus infects a human host where it can multiply; in the absence of the host it cannot survive, and stopping the transmission of the virus from a person to another person will decrease the infection rate of the disease to a level where it can eventually die. This can be achieved only with the support and cooperation of individuals, communities, local bodies and authorities. With the use of masks, ventilation, distancing, and sanitation, the battle against the virus can be won.



Website link:
https://static.pib.gov.in/WriteReadData/userfiles/advisorcov.pdf
https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/may/doc202151941.pdf

Government of Odisha develops advanced tech tools to combat COVID-19

Government of Odisha has developed COVID Dashboard to tackle the pandemic transparently and efficiently through technology. The COVID-19 dashboard depicts information of the status of the pandemic at state and district level. In addition to the epidemiological data, the dashboard is regularly updated, and it provides information on COVID care hospitals and centres based on number of bed available, government orders, age-wise and gender-wise summary, State-wide Vaccination Coverage, Testing Summary and many more.

Website link:
https://statedashboard.odisha.gov.in/

National Institute of Epidemiology releases e-Book to control COVID-19 second wave

The COVID-19 pandemic has become the most significant global public health emergency to public health, human society, and the environment.

Various mitigation strategies have been implemented by States, Districts and Cities in India to contain the rapid spread of the Coronavirus, such as complete or partial lockdown, travel bans, mass gathering restrictions, and home quarantines within communities, social distancing measures, personal protective actions, tracing and treatment.

National Institute of Epidemiology (NIE) released a compendium of strategies to be followed to overcome the second wave rapidly. The immediate priority is to reduce the COVID-19 deaths. Simultaneous mitigation efforts will help in reducing the spread of COVID within few weeks.

The practices and initiatives in the compendium have been categorized under eight areas:

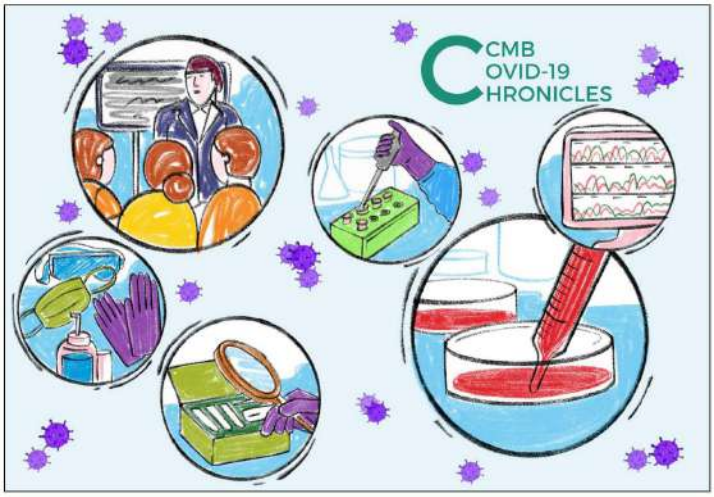
1. Establish COVID Management Centre;
2. Reduce deaths;
3. Reduce the spread;
4. Establish data dashboards;
5. Establish alert system to turn on and off physical distancing measures;
6. Communicate effectively and counter misinformation;
7. Scale-up vaccination; and
8. Sustain non-cOVID services.

Effective implementation of these strategies in the short term and medium term will certainly reduce deaths, spread of disease and prepare the health system for future outbreaks. The current situation calls for all stakeholders' strong involvement, including the community, to work in synchrony to win this war against COVID-19.

Website link:
http://www.nie.gov.in/images/leftcontent_attach/COVID_Strategy_Document_with_Cover_pic_compressed_278.pdf

CSIR-CCMB releases COVID-19 Chronicles

Centre for Cellular & Molecular Biology (CCMB), an autonomous institute of CSIR, Government of India has come up with COVID-19 chronicles that provides an insight into the technologies developed, research on COVID-19, training programmes for mitigation of the pandemic.

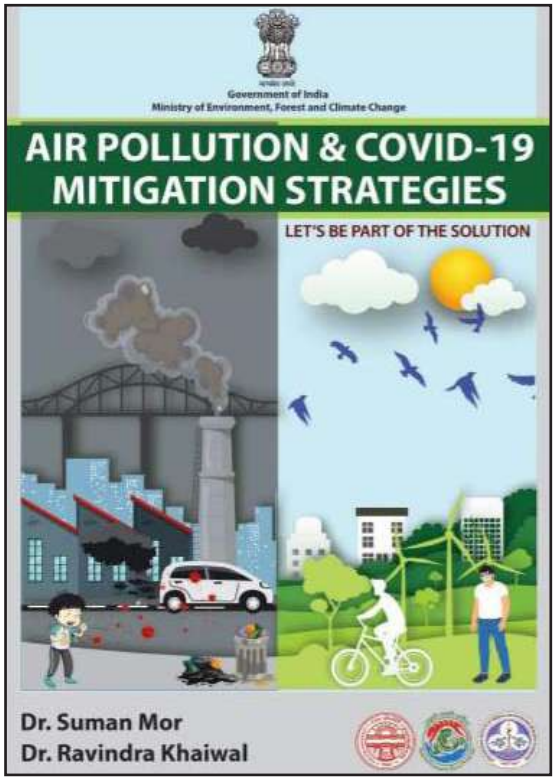


Website link:
https://www.ccmb.res.in/docs/COVID_response_book_Edition_2.pdf

PGIMER releases infographic booklet on air pollution and COVID-19 mitigation strategies

Globally COVID-19 has caused a serious impact on human health by affecting the respiratory system. Among all the people, COVID-19 could disproportionately affect the vulnerable population and people with diseases. The higher levels of air pollution also increase the susceptibility of COVID-19 especially in the vulnerable population. The poor air quality affects

our lungs and other body organs, increasing the risk of various respiratory diseases. Understanding the correlation of poor air quality and COVID-19 is extremely important to respond wisely to reduce the impact on respiratory system. During COVID-19, air pollution can worsen the health condition of a person with respiratory and circulatory diseases and may lead to increase in severity of cases.



Bringing awareness about air pollution sources (indoor as well as ambient) and associated health impacts during COVID-19 has become utmost important. Addressing the issue of air pollution will help and lead to decline in morbidity and mortality as well as decline in respiration-related illnesses during COVID-19 pandemic. To address these issues complete awareness and preventive measures about poor air quality and COVID-19 is very essential.

Post Graduate Institute of Medical Education & Research, Chandigarh (PGIMER) has brought out an infographic-based booklet on air pollution and COVID-19 mitigation strategies to create awareness among the public and to minimize the health impact of air pollution and COVID-19 on people.

Contact Info: Khaiwal.ravindra@pgimer.edu.in, sumanmor@pu.ac.in

Website link:
http://moef.gov.in/wp-content/uploads/2021/03/Air-Pollution_COVID_Mitigation_MoEFCC_PU_PGI_23-Feb-21.._compressed.pdf

http://moef.gov.in/en/air-pollution-covid-19-mitigation-strategies/

Outreach initiatives by India Science Channel

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

Science and Technology are the main driving forces of the nation and fundamental to progress and growth. So, the advantages of science and technology must reach all sections of 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 account of the information products produced by India Science.

1. Weekly COVID-19 video bulletin: Produced in both Hindi and English on weekly basis from 7 July 2020, COVID-19 bulletin apprises the audience about the latest developments happening in the S&T scenario in India that are helping in managing and overcoming the challenges thrown up by the pandemic. Vigyan Prasar produced daily COVID-19 Bulletin from 11th April to 06 July 2020. Thereafter, a weekly bulletin is being produced which provides details about the most important S&T updates from the country related to COVID-19. From January 2021 onwards the COVID Bulletin carried news about vaccination drive initiated by the Government of India.
2. COVID Explained - Short films to explain the important research findings related to COVID-19 and COVID-19 vaccination in layman's language are produced on weekly basis. The topics chosen for COVID Explained cater to the curiosity of common man towards COVID-19.
3. Facebook live sessions on interviews of various stakeholders on COVID-19 Vaccination Programme.
4. Facebook and India Science live sessions on interviews with experts on COVID-19 Vaccination.
5. Live Phone-in programme: A live phone-in programme on COVID-19 vaccination is telecast from India Science on every Monday and Tuesday. Experts from the field give answers to the questions related to COVID-19 vaccination received from the audience.
6. India Science started "Corona Ko Harana Hai" from April, 2021. In this India Science team interview top medical professionals of the country on COVID-19-related issues.
7. India Science makes infographics on different issues related to COVID-19.

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

Staying healthy while studying or working online – a booklet released by PGIMER

The COVID-19 pandemic has drastically changed the way we work, communicate, and socialize and left us with the challenge of making significant changes in a matter of days on an extraordinary scale.

PGIMER released an infographic booklet which provides step-by-step guide, how we can limit our screen time to remain mentally and physically active to address the mental health and psychosocial aspects during conditions like COVID-19 and beyond. This pictorial booklet titled 'Staying Healthy While Studying or Working Online' will be a valuable tool to educate everyone in simple, easy-to-grasp pictures about the importance of proper sleep, adequate lighting, a comfortable workplace and short exercises to reduce strain while working or studying online.

Contact Info: Khaiwal.ravindra@pgimer.edu.in, sumanmor@pu.ac.in

Website link:
https://www.care4cleanair.com/awarnessmaterial

IIT Gandhinagar releases white paper to help other institutions in setting up in-house Covid Care Facilities

Indian Institute of Technology (IIT), Gandhinagar has come out with a white paper to help educational and other institutions establish in-house COVID care facilities to tackle the surge in cases. This Whitepaper outlines the lessons from the development of IIT Gandhinagar's Covid Care Facility in the hope that it will encourage other institutions and communities to develop similar facilities to provide relief to their community members and reduce the strain on the local, state, and national medical infrastructure.

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Website link:
https://iitgn.ac.in/pdf/ccf.pdf

Guideline for oxygen self-use during homecare by PGIMER-Chandigarh & Panjab University

As the second wave of COVID-19 sweeps through the country with deadly consequences, doctors across the state have started advocating proning exercises to improve oxygen levels in COVID-positive patients — both in home isolation as well as in hospital. To overcome the challenge, Postgraduate Institute of Medical Education and Research (PGIMER, Chandigarh) and Panjab University (PU) have created an educative guideline for oxygen self-use during homecare.

The Guideline advises people to not panic if they experience any COVID-19 symptoms, as the majority of people can manage their infections at home by following self-care measures. It lists the common symptoms of the disease and recommends that at the first sign of experiencing the symptoms, people should isolate at home and begin following self-care measures. It asks people to not worry or become anxious, as these interfere with the body's natural immune response to fighting the infection.

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Website link:
https://www.care4cleanair.com/awarnessmaterial

Outreach initiatives through India Science, Technology and Innovation (ISTI) Web Portal

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

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

The web portal provided all information related to COVID-19, its presentation of symptoms, transmission modes and mechanisms, and various models of protection of individuals, healthcare professionals and prevention from spreading to the community. The reasons, usefulness, and impact of social distancing have been communicated in an easy-to-understand manner.

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Website link:
https://www.indiascienceandtechnology.gov.in/

COVID 2021: Nation's S&T Efforts Against COVID-19 – An e-Newsletter on COVID-19

For the benefit of its target audience and reaching out to researchers and scientists in special and common public in general, Vigyan Prasar published a regular e-Newsletter on the most relevant initiatives and efforts taken by Government of India through its various Science Ministries, Departments, and Funding Organisations. These organisations are continuously

striving for combating the outbreak of COVID-19. These research-driven and technology-based interventions have been initiated to combat the outburst of the pandemic.

The e-Newsletter aims to be a handy guide to scientists, researchers, and scholars, especially those who are interested in knowing various aspects of COVID-19 and contributing to the coronavirus warfare and making the nation Atmanirbhar. It provides authentic information to the readers and validates the usefulness of any published information.

Contact Info: covidnewsletter@vigyanprasar.gov.in

Website link:
https://www.indiascienceandtechnology.gov.in/covid-19-the-pandemic/newsletter-archive

10
COVID FACT-CHECKS

The section attempts to answer frequently asked questions (FAQs) on various aspects of the COVID-19 disease, its mitigation during the second wave, and subsequently busting out the myths spread in the society.

COVID FACT-CHECKS

1. Related to Use of Oxygen during current COVID-19 Pandemic

Q. What is the normal respiratory rate of a healthy adult person?

A. Standard respiratory rates for a healthy adult range from 12 to 20 breaths per minute.

Q. Are 8 breaths per minute normal?

A. No. A patient needs to be evaluated medically.

Q. How many litres of oxygen per minute do we breathe?

A. The average tidal volume, i.e., the average amount of air inhaled and exhaled per breathing cycle, is 0.5 litre (500 ml). Minute ventilation (VE) is the total volume of air entering the lungs in a minute is 6 litres per minute.

Q. What should be the normal oxygen saturation as recorded by a Pulse Oximeter?

A. The normal oxygen saturation level in the blood (SpO2) should be 95% or higher. Some people with chronic lung disease, such as Chronic Obstructive Pulmonary Disease (COPD) or sleep apnea, may have normal levels of around 90%. The "SpO2" reading on a pulse oximeter shows the percentage of oxygen in the blood. If your home SpO2 reading is lower than 94%, call your healthcare provider.

Q. How do I check my oxygen level at home without a Pulse Oximeter?

A. If you do not have a portable finger pulse oximeter in your home, you can also learn how to assess signs and symptoms of low oxygen levels. Two classic signs of a low oxygen level are a rapid heart rate and a fast breathing rate. An average heart rate is 60–100 beats per minute and an average breathing rate is 12–20 breaths per minute. However, under low oxygen conditions, body responses include an increase in heart rate and breathing rate. Another sign of a low blood oxygen level is cyanosis or a bluish color change on your lips, nose, or fingertips. As your body loses oxygen, the blood cells in your body change colour in your bloodstream to a dark blue, which can be seen from the outside of your skin if it is severe. Cyanosis is typically a late sign of low oxygen levels and is considered a medical emergency. If you notice this bluish discolouration, you should immediately visit the nearest hospital.

Q. Do we see many cases of silent hypoxia in this wave? How can this be addressed?

A. Silent hypoxia or happy hypoxia is referred to as the early stage of COVID-19. As the oxygen level drops, one may start feeling shortness of breath, confusion, and other symptoms. Keep watching for these signs and do not ignore them. This is true for young people as well. If you monitor low oxygen level, change in lip colour from natural to blue or persistent sweating, consult the covid helpline or doctor. They could be the early sign of silent hypoxia.

Q. In brief, how can proning help enhance blood oxygen levels?

A. Proning is a medically accepted process to improve the distribution and exchange of oxygen in the lungs. A patient is safely placed from their back onto their abdomen (stomach), i.e., having face down to improve breathing and oxygenation. It has been shown beneficial for COVID-19 patients with compromised breathing comfort, especially during home isolation.

Q. Is pure oxygen used in hospitals?

A. Medical oxygen contains high purity oxygen used for medical treatments and is developed for use in human body. Cylinders contain a compressed oxygen gas and no gases are allowed in the cylinder to prevent contamination.

Q. What is the use of Medical Oxygen?

A. Oxygen is used for treatment in hospitals. Hence, it is considered a drug or a pharmaceutical product.

Q. What is the need for Medical Oxygen?

A. The human body requires oxygen to survive, and typically, we breathe in from air. However, if you have lung disease or other medical conditions such as COVID-19, you may not get enough oxygen due to compromised lungs. That can leave you short of breath and cause problems with your heart, brain, and other parts of your body.

Q. Can breathing 100 per cent oxygen harm your body?

A. Yes. Breathing 100% oxygen also eventually leads to collapse of the alveoli (atelectasis).

Q. Can you get excess (more than required) oxygen from an Oxygen Concentrator?

A. It is possible to get excess (more than required) oxygen from an oxygen concentrator. However, this is quite rare when oxygen concentrators are used as directed and prescribed. All supplemental oxygen requires a prescription from a doctor, who carefully chooses your oxygen requirement.

Q. What is the role of oxygen during COVID-19 Disease?

A. The demand for medical oxygen is increased in COVID-19 as the disease primarily affects the lungs and, in severe cases, causes death due to Acute Respiratory Distress Syndrome (ARDS) and pneumonia.

Q. When does a patient require medical oxygen in a COVID-19 positive case?

A. As per AIIMS/ICMR-Covid-19/National Task Force/Joint Monitoring Group (Dte.GHS), MoHFW, Government of India, Clinical Guidelines for Management of Adult COVID-19 Patient

issued on 22 Apr 2021, moderate and severe cases of COVID-19 where the infection induces shortage of oxygen in the body due to its impact on lungs require medical oxygen and immediate oxygen therapy. Oxygen acts as a life-saver for COVID patients.

Q. What is Moderate COVID-19 cases?

A. In moderate COVID-19 cases a patient has upper respiratory tract symptoms (and/or fever) with shortness of breath. They have a respiration rate more than or equal to 24/minute and SpO_2 90% to 93% with ambient air.

Q. What is severe COVID-19 cases?

A In severe Covid-19 case, a patient has upper respiratory tract symptoms (and/or fever) with shortness of breath. They have a respiration rate more than 30/minute and SpO_2 less than 90% in room air.

Q. When does a patient require Mechanical Ventilator Support?

A. A patient may be put on a mechanical ventilator if it becomes very difficult to breathe or get enough oxygen into their blood. This condition is called respiratory failure. Mechanical ventilators are machines that act as bellows to move air in and out of the patient's lungs. The respiratory therapist and doctor set the ventilator to control how often it pushes air into the lungs and how much air the patient gets. The patient may be fitted with a mask to get air from the ventilator into there lungs. Or they may need a breathing tube if their breathing problem is more serious.

Q. Can Mechanical Ventilation be given at home?

A. Mechanical ventilators are mainly used in hospitals and transport systems such as ambulances and medical evacuation by air transport etc. In some cases, they can be used at home if the illness is long-term and the caregivers at home receive training and have adequate nursing and other resources at home. Being on a ventilator may make a patient more susceptible to pneumonia, damage to the vocal cords, or other problems.

Q. What is the 6-minute walk test for COPD?

A. The 6-min walk test (6MWT) is an exercise test that measures functional status in chronic obstructive pulmonary disease (COPD) patients and provides information on oxygen desaturation. This test is also being used for COVID-19. In case of COVID-19 symptoms, SpO_2 level must be checked before taking a walk. Now, walk for 6 minutes without a break on an even surface and measure the SpO_2 level. It may fall 1-2%, but consult a medical professional if it falls below 93%.

(Source: https://ndma.gov.in/sites/default/files/2021-03/FAQs-on-Use-of-oxygen-.pdf)

2. Related to drugs and medications fighting the disease

Q. Is Remdesivir effective in the treatment of COVID-19?

A. No study has conclusively been able to prove that Remdesivir is beneficial in the treatment of COVID-19. However, India has approved Remdesivir under the National Clinical Management Protocol for COVID-19, which was developed after many interactions

by a committee of experts. The protocol acts as the guiding document for the treatment of COVID-19 patients in India. Remdesivir is listed as an investigational therapy in the protocol, i.e., where informed and shared decision-making is essential, besides noting contraindications mentioned in the detailed guidelines.

Q. What Is Remdesivir? How Does Remdesivir Work?

A. Remdesivir is an investigational drug used to treat viral infections. It is classified as a broad-spectrum antiviral with potential antiviral activity against a variety of RNA viruses.

The drug works against the novel coronavirus by inhibiting replication of the virus in the body. Remdesivir functions as a prodrug that is modified in the body before it becomes an active drug. It is classified as a nucleoside analog, one of the oldest classes of antiviral medications, and resembles the RNA base adenosine. In general, nucleoside and nucleotide analogues simulate the structure of a true nucleoside or nucleotide. The simulated structure may then be incorporated into the virus. Remdesivir works when the enzyme replicating the genetic material for the novel coronavirus—RNA polymerase—incorporates the adenosine analogue in place of the natural molecule into the growing RNA strand. By introducing the modified agent, Remdesivir, replication of the novel coronavirus is interrupted, and the virus ceases to multiply and cannot infect more cells in the body.

Q. When should a patient of COVID-19 take Remdesivir?

A. The timing of the drug, when it is administered, is most important. Taking it too early or too late could do more harm than good. Remdesivir is applicable only in hospitalised patients who showed very low oxygen saturation and infiltrated their chest X-ray or CT scan. The optimal timing for Remdesivir is usually after five to seven days of having the virus. Early to mild or asymptomatic patients should not take Remdesivir. Also, it is of no use if it's given very late because it would create a cytokine storm. A cytokine storm is when the immune system goes into overdrive. The body starts to attack its cells and tissues instead of just the virus.

Q. Is Remdesivir can be taken at home?

A. Remdesivir comes in a vial and has to be injected only after prescription and in the presence of a health practitioner. It is for patients who are hospitalised and severe. Therefore, it should not be given at home. It is for patients who need to be admitted and need hospital care.

Q. Are steroids effective in the treatment of COVID-19?

A. There is no evidence to support the use of steroids in the treatment of COVID-19. World Health Organization (WHO) recovery trial showed that steroids do have a beneficial effect. But again, the timing is critical. The recovery trial clearly showed that if we give steroids too early, it showed a harmful effect before oxygen saturation. Steroids are most effective during the later part of the disease when there is more inflammation and oxygen saturation is falling. Steroids are only helpful for moderate or severe cases.

Q. Is plasma a good way to fight off COVID-19?

A. Convalescent plasma has been a therapy devised to passively transfer antibodies from a recovered person to a new patient. While the therapy has been received with different opinions by the medical community, the important aspect is timing. It's better if plasma therapy is used early before clinical worsening. Also, plasma with high titer neutralising antibodies would have

better results. Hence, to achieve good results, correct patient selection, timing and a good quality plasma donor are needed for success in this form of treatment.

Q. Should a person with COVID-19 take Tocilizumab?

A. Tocilizumab is a drug of last resort. It should only be used when a COVID-19 infection in a patient is worsening despite steroids, Remdesivir and other treatments like anticoagulants. Tocilizumab is required in less than 2% of COVID-19 patients. Very few patients need this drug because it's only for treating a cytokine storm and has a limited role.

Q. Is Favipiravir effective in treating COVID-19?

A. Favipiravir is another antiviral that is being promoted for the treatment of COVID-19. It was initially doled out as a treatment of influenza after the H1N1 pandemic. There is not enough evidence in robust studies to show that it is a good drug. Since it's not a proven treatment, India's national guidelines also don't recommend its use.

Q. Is it possible to treat COVID-19 without any of the drugs mentioned above?

A. People with mild COVID-19 or those who are asymptomatic will improve with just symptomatic treatment. Mild COVID-19 infection can be treated with paracetamol, good hydration and multivitamins —without any treatment. Giving treatment when it is not required may be doing more harm than good.

3. Related to Black Fungus and COVID-19 Disease

Q. What is Black Fungus?

A. Black fungus, also known as MUCORMYCOSIS, is a rare fungal infection. It is called "black" because of the colour of the fungal growth. It is caused by exposure to mucor mould found in soil, manure, and rotten/decaying fruits and vegetables. It is ubiquitous and even present in the nose/mucosa of healthy individuals. This disease usually affects the sinuses, eye orbit, and brain. That is why it is also called "rhino-orbital-cerebral" mucormycosis. It may be life-threatening in immunocompromised individuals (cancer patients, HIV/AIDS) and people with uncontrolled diabetes.

Q. What are the risk factors for acquiring Black Fungus infection?

A. Risk Factors are:

- Uncontrolled Diabetes Mellitus
- Treated for COVID-19 with corticosteroids
- Treated for COVID-19 with immunomodulators
- Treated for COVID-19 with mechanical ventilation
- Prolonged oxygen therapy
- Prolonged ICU stay
- Immunocompromised state

Q. Why the sudden increase in Black Fungus cases?

A. It may be triggered by extensive use of steroids, which is a life-saving treatment for moderate to severe COVID-19 infection. Steroids lower the immunity and cause a sudden up-shooting of blood sugar levels in diabetes and non-diabetic patients. For patients on humidified oxygen, care should be taken to make sure there is no water leak to prevent the growth of the fungus.

Q. How serious is Black Fungus?

A. Black fungus infection causes a vision-threatening and life-threatening condition.

Q. Do all COVID-19 patients need to be worried about Black Fungus infection?

A. No. As discussed, high-risk patients need to be alert. Also, during COVID-19 recovery, everyone should watch out for early signs and symptoms.

Q. What are the precautions one can take to avoid this disease?

A. Following precautions one can take:

- Boost immune system with diet, hydration and exercise.
- Rational use of steroids by follow guidelines.
- Strict Blood sugar monitoring and control in all patients who are on steroids.

Q. What are the early signs of Black Fungus?

A. some of the early signs are:

- Facial pain
- Facial swelling/puffiness/discolouration
- Sinus headache
- Stuffy nose
- The blurring of vision/decreased vision
- Double vision
- Drooping of eyelid
- Blood-stained nasal discharge
- Dental pain

Q. Is Black Fungus treatable?

A. Yes. Early diagnosis and a prompt multi-speciality team of medical professionals can manage it.

Q. Which specialist should I visit for Black Fungus?

A. ENT and eye specialists are central to this disease. The team includes care coordination with neurosurgeon endocrinologist and microbiologist.

(Source: https://www.eyeqindia.com/frequently-asked-questions-on-covid-and-black-fungus/#toggle-id-9)

4. Related to Indoor Air and COVID-19 Disease

Q. Will running an evaporative cooler help protect my family and me from COVID-19?

A. Evaporative coolers (or "swamp coolers") can help protect people indoors from the airborne transmission of COVID-19 because they increase ventilation with outside air to cool indoor spaces. Evaporative coolers are used in dry climates. They use water to provide cooling and improve relative humidity in indoor microenvironments. When operating as intended (with open windows), these devices produce substantial increases in ventilation with outdoor air. Some evaporative coolers can be performed without using water when temperatures are milder to increase ventilation indoors. Avoid using evaporative coolers if air pollution outside is high and the system does not have a high-efficiency filter.

Q. Is ventilation important for indoor air quality when cleaning and/or sanitising for COVID-19 indoors?

A. When cleaning and disinfecting for COVID-19, ventilation is essential—in general, increasing ventilation during and after cleaning help to reduce exposure to cleaning and disinfection products and by-products. Increasing ventilation, for example, by opening windows or doors, can also reduce risks from particles resuspended during cleaning, including those potentially carrying SARS-CoV-2 (or other contaminants). Avoid ventilation with outdoor air when outdoor air pollution is high or when it makes your home too cold, hot, or humid.

Q. Will an air cleaner or air purifier help protect my family and me from COVID-19 in my home?

A. When appropriately used, air purifiers can help reduce airborne contaminants, including viruses, in a home or confined space.

Q. How can I increase ventilation at home to help protect my family from COVID-19?

A. Ensuring proper ventilation with outside air is a standard best practice for improving indoor air quality. To increase ventilation in your home, one can:

- Open the windows or screened doors, if possible;
- Operate an air conditioner that has an outdoor air intake or vent; and
- Operate a bathroom fan when the bathroom is in use and continuously, if possible.

However, the practices mentioned here are not enough to protect people from COVID-19. When used along with other best practices recommended by the Ministry of Health and Family Welfare, Govt. of India, the above methods can be part of a plan to protect yourself and your family.

(Source: https://www.epa.gov/coronavirus/indoor-air-and-coronavirus-covid-19)

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COVID-19

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For suggestions & Feedback, write to us at: covidnewsletter@vigyanprasar.gov.in

TOGETHER WE CAN AND WE WILL BEAT THE PANDEMIC OUT

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