

COVID-19

Science & Technology Efforts in India

UPDATED FORTNIGHTLY

30TH APRIL 2021

Compiled by

विज्ञान प्रसार
VIGYAN PRASAR

An Autonomous Organization of
Department of Science & Technology,
Government of India

VOL. IV | ISSUE 1

IN THE FACE OF ADVERSITY,
WE HAVE A CHOICE - STAY UPDATED WITH SCIENTIFIC FACTS

PREFACE

In 2020, India dealt the first wave of COVID-19 pandemic with collective measures and scientific approach and awareness. However, the pernicious second wave of the pandemic has aggravated the chasm. Though we have vaccines and some well-defined treatment protocols to fight out it out, we are not out of the woods yet. In India, till May, 16.7 crore doses of vaccines have been given and 3.41 crore people have been fully vaccinated.

We understand that in times of crisis it may not always be possible to obtain all required data, and that reporting may – of necessity – be curtailed. The present edition, COVID 2021: Nation's S&T Efforts Against COVID-19 has been compiled with the aim to inform readers and strengthen the usefulness of any published information. The scientific community has done extremely well in their fight against the COVID-19 pandemic. However, from the perspective of the media and general public, this could not always be ascertained clearly enough. To bridge this gap and with an aim of taking the message of “Science gathers knowledge faster than society gathers wisdom”, Vigyan Prasar reached out to its audiences in the shape a regular e-newsletter – S&T Efforts in India on COVID-19 – from the early days of the outbreak of the pandemic, taking its mandate of science communication, popularisation and extension to the next level. The present edition is for sensitising the readers on the second wave of the pandemic, recent developments and steps taken to mitigate it.

In the face of adversity, we have a choice: to stay updated with scientific and evidence-based information instead of cluttering our mind with misleading, half-baked information. We wish an engaging reading to our audiences across all strata of the society and look forward to suggestions and feedback from them at covidnewsletter@vigyanprasar.gov.in. This, indeed, will help us add more value to the efforts in taking science to the society.

30th April 2021

Vigyan Prasar

New Delhi

INDEX

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/>

TOPICS

PAGE NO.

1. Press Releases	1-3
2. Guidelines	4-9
3. Research Stories	10-14
4. Significant Efforts	15-24
5. COVID Communication & Resources	24-28

PRESS RELEASES

DBT-BIRAC-supported ‘Virafin’ from Zydus gets emergency nod for treating moderate COVID-19 infections in adults

24 APR 2021

Drug Controller General of India (DCGI) gave a restricted emergency use approval to the Zydus Cadila’s ‘Virafin’ for treating patients showing moderate COVID-19 symptoms. Virafin is a pegylated interferon alpha-2b (PegIFN), which when subcutaneously injected to the patient in the early stages of infection, resulted in their faster recovery.

For the development of Virafin, Zydus appreciated the support provided by **DBT-BIRAC COVID 19 Research Consortium** through NBM, for conducting the Phase II human clinical trial studies. The studies confirmed safety, tolerability and efficacy of Virafin. The studies also reported that Virafin reduces viral load and aid in managing the disease in a better way, such as reduction in the need for supplemental oxygen, thereby reducing the respiratory tension caused due to low oxygen levels.

Speaking on this achievement Dr Renu Swarup, Secretary, DBT and Chairperson, BIRAC said, “The government has been committed to provide all possible facilitation to our industries to work towards mitigation strategies and interventions against COVID-19 pandemic. The emergency nod provided to Virafin is another milestone which is a boon for the medical facility providers. I highly appreciate the efforts put in for this achievement.”

Phase III clinical trial studies reported that a larger proportion of patients when administered subcutaneously with Virafin turned out to be RT-PCR negative by day 7, apart from faster recovery as compared to other anti-viral agents.

Website link: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713722>

Twenty-five new manufacturing sites approved for Remdesivir production

23 APR 2021

Minister of State for Chemicals & Fertilizers Shri Mansukh Mandaviya informed that 25 new manufacturing sites for Remdesivir's production have been approved since 12th April 2021.

He said, “Production capacity is now ramped up to more than 90 lakhs vials per month, earlier it was 40 lakhs vials/month. Very soon, 3 lakh vial/day will be produced. Monitoring is being done on daily basis. We would not leave any stone unturned to supply Remdesivir.”

Website link: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713625>

Special 'Oxygen Express' trains to run through Green Corridors for transport of liquid medical oxygen

18 APR 2021

The country has been facing an unprecedented surge in the new daily cases of COVID-19. Medical oxygen is a critical component in the treatment of COVID-19-affected patients. Due to this recent surge, the requirement of oxygen for effective clinical treatment of COVID-19 patients has also witnessed a manifold hike. Department for Promotion of Industry and Internal Trade (DPIIT) has conveyed that this has already reached about 60 per cent of the total daily oxygen production, and is expected to rise further. There have been reports of shortage of medical oxygen from some States and UTs.

Government of India has been regularly monitoring and ensuring smooth supply of essential medical equipment including medical oxygen to the affected states and addressing challenges



that arise from time to time. The Empowered Group-II (EG-II) headed by Secretary, Department for Promotion of Industry & Internal Trade (DPIIT) is mandated by Govt. of India to manage requisite supplies of medical equipment and drugs including medical oxygen across the country. Several immediate and timely measures have been taken in the recent days by GoI to address the issue of adequate availability of medical oxygen across the country. While every effort is being made to meet the rising demand for medical oxygen, including augmenting daily production and stocks and States/UTs are taking appropriate steps for optimum and rationalized utilisation of available stock of oxygen, the present trend necessitates

additional measures.

The Railways Ministry is gearing up to transport Liquid Medical Oxygen (LMO) and Oxygen Cylinders across the key Corridors and to run OXYGEN Express. To facilities easy and smooth transport of oxygen across the country, a Green Corridor is being created to fast movement of Oxygen Express Trains. This will ensure supply of medical oxygen in bulk and rapidly to patients.

Website link: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1712590>

Union Minister of Education launches DuroKea Series developed by IIT Hyderabad researchers

16 APR 2021

Union Minister for Education Shri Ramesh Pokhriyal ‘Nishank’ virtually launched “World 1st affordable and long-lasting hygiene product DuroKea Series”, developed by IIT Hyderabad researchers. Led by Dr Jyotsnendu Giri, Associate Professor in Biomedical Engineering and founder EaffoCare Innovation Pvt. Ltd incubating at iTIC, IIT Hyderabad the team has developed innovative DuroKea long-lasting technologies to combat spreading of COVID-19 virus. Chairman, Board of Governors, IIT Hyderabad, Shri B. V. R. Mohan Reddy; Prof. Founder Dean ESIC Medical College and Hospital, Hyderabad, M. Srinivas; Director IIT Hyderabad, Prof. B. S. Murty and other officials from IIT Hyderabad were present on the occasion.

DuroKea is aligned with the vision of Prime Minister Shri Narendra Modi to attain self-reliance. This next generation antimicrobial technology starts at Rs. 189, kills 99.99% of germs instantly, and leaves behind the long-lasting protective nanoscale coating up to 35 days till next wash.



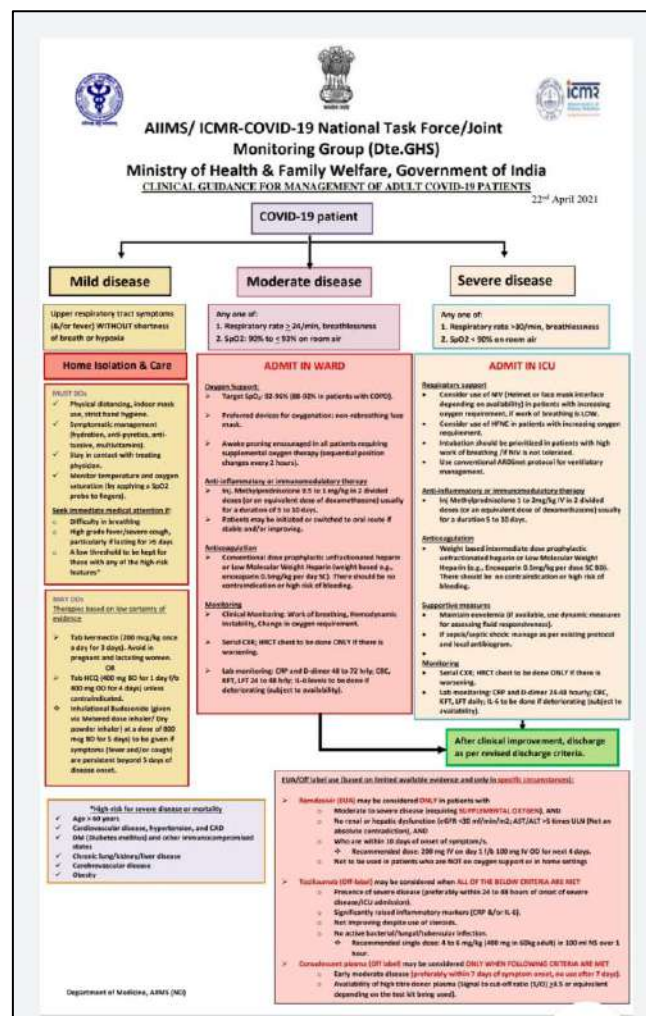
This is a highly effective and affordable research innovation from IIT Hyderabad, developed by a team led by Dr Jyotsnendu Giri, Department of Biomedical Engineering, IIT Hyderabad. Members of the team Dr Sunil Kumar Yadava, Dr Qasim M, Ms. Meenakshi Chauhan, Ms. Ruby Singh, Ms. Suparna Basu, Ms. Uzma Hasan, Mr Jayakkumar and Dr Purandhi Roopmani share a common vision with this innovation.

Website link: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1712225>

GUIDELINES

Clinical guidance for management of adult COVID-19 patients released to cater to the needs of common people

The All India Institute of Medical Science (AIIMS) and the Indian Council of Medical Research (ICMR) have jointly issued new guidelines 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 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. Also mentioned specifically, in the case of moderate infections, India's apex hospital has recommended that the concerned patient should be admitted into a hospital ward.



Website Link: <https://covid.aiims.edu/clinical-guidance-for-management-of-adult-covid-19-patients/>

ICMR releases guidelines to enhance availability of COVID-19 testing kits and newer innovative testing solutions in India

ICMR has proposed to exempt several reputed global agencies from validation criteria for RT-PCR, RAT, home-based testing solution, antigen, antibody ELISA and rapid antibody tests. It further proposed to accord marketing permission by the Drugs Controller General of India on the basis of existing approvals. Several global agencies of Europe, Japan, South Korea, Australia, Brazil, and the agencies listed in the World Health Organization's emergency use listing will benefit from this move. At present, kits approved by the US Food and Drug Administration under regular or emergency use are exempted from validation in India. It qualifies for direct marketing permission from the Drug Controller General of India. Moreover, this guidance is also applicable for tests using the nasopharyngeal, oropharyngeal, throat, nasal, oral, saliva, mouth rinse, gargle, blood, and serum samples.

Contact Info: drneetu.vijay@icmr.gov.in, ajaysinghdhama@gmail.com

Website Link:

https://www.icmr.gov.in/pdf/covid/kits/Guidance_COVID_testing_commodities_27042021.pdf

Office of the PSA releases home care tips for managing COVID-19 second wave

The Office of the Principal Scientific Adviser to the Government of India has curated information and brought a simple visual reference to manage mild symptoms of COVID-19 at home – “Home care tips for managing COVID-19”.



The reference advises people not to 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 not to worry or become anxious, as these interfere with the body's natural immune response to fighting the infection.

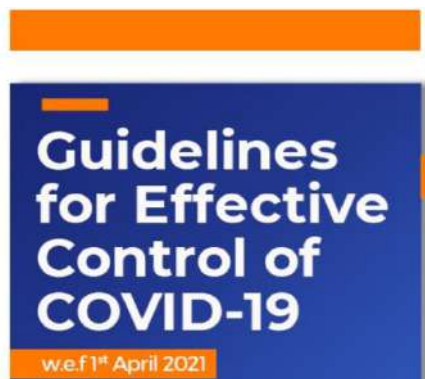
The guide outlines the importance of getting vaccinated to reduce the spread of the virus. It also reminds people that even after being vaccinated, it is essential to continue to follow COVID-appropriate behaviour.

Website link:

https://static.psa.gov.in/psa-prod/psa_custom_files/PSAHomeCareTips_COVID-19_FINAL_ENGLISH_V2.pdf

MyGov released guidelines for effective control of COVID-19 during second wave

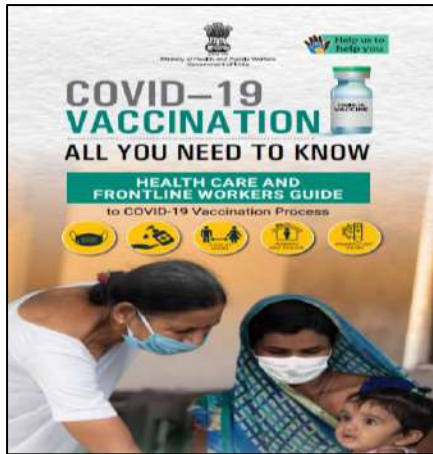
To sustain the second wave of COVID-19, MyGov has released guidelines to curtail the transmission by 4 major steps, that is, enforcement of Test-Track-Treat-Vaccination Protocol.



Website link: https://static.mygov.in/rest/s3fs-public/mygov_161725058451307401.pdf

MoHFW releases guidelines for healthcare and frontline workers on COVID 19 vaccination

The Ministry of Health and Family Welfare (MoHFW) have issued COVID-19 vaccination guide for healthcare and frontline workers. It is mentioned in the guide that beneficiaries in phase 1 of COVID-19 vaccination in India are healthcare workers, frontline workers, including personnel from State and Central Police Organisations (CPOs), Armed Forces,



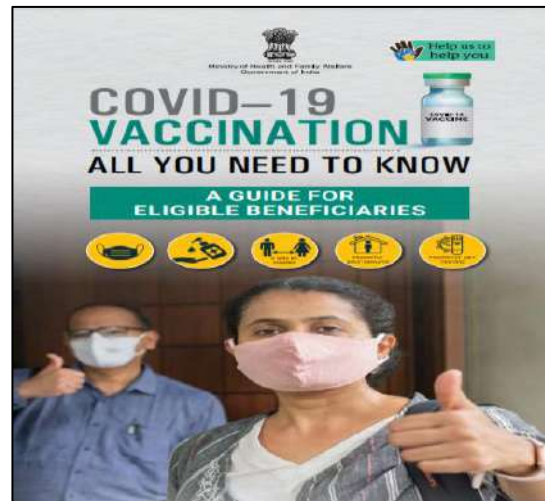
home guards, prison staff and civil defence volunteers including disaster management volunteers, municipal workers, revenue officers engaged in containment and surveillance activities etc. This information guide explains why the vaccine is important and how to register for the vaccination.

Website Link:

<https://www.mohfw.gov.in/pdf/COVID19VaccinationGuideforHealthcareandFrontlineWorkers.pdf>

MoHFW released guidelines for eligible beneficiaries on COVID-19 vaccination

Ministry of Health and Family Welfare (MoHFW) have issued COVID-19 vaccination guide for all eligible beneficiaries. According to the Guidelines beneficiaries in phase 1 of COVID-19 vaccination in India include adults who are over 50 years and persons under 50 years with associated comorbidities such as hypertension/diabetes/HIV/cancer/cardiovascular disease. This information guide explains why the vaccine is important and how to register for the vaccination.



Website Link:

<https://www.mohfw.gov.in/pdf/COVID19VaccinationGuideforEligibleBeneficiaries.pdf>

Guidance for approval COVID-19 vaccines in India for restricted use in emergency situation which are listed in WHO Emergency Use Listing (EUL)

In light of the eruption of the second wave of COVID-19 pandemic, to tackle the emergency situation by increasing the availability of safe and effective vaccines, Central Drugs Standard Control Organization (CDSCO) released guidelines for vaccines, in pursuance of

recommendations of the National Expert Group on Vaccine Administration for COVID-19 (NEGVAC).

Website link:

https://cdsco.gov.in/opencms/opencms/system/modules/CDSCO.WEB/elements/download_file_division.jsp?num_id=NzE0Mw==

Protocol for Management of COVID-19 in the paediatric age group released by MoHFW

Ministry of Health and Family Welfare (MoHFW) has come out with a protocol for the Management of COVID-19 in the paediatric age group. According to the protocol, asymptomatic children are usually identified while screening, if family members are identified. Such children do not require any treatment except monitoring for development of symptoms and subsequent treatment according to assessed severity. Children with mild disease may present with sore throat, rhinorrhea, cough with no breathing difficulty and few children may have gastrointestinal symptoms also. Such children do not need any investigations.

As per the protocol, these children can be managed at home with home isolation and symptomatic treatment. Treatment of mild illness in home isolation is symptomatic. There should be regular communication with the doctor or healthcare worker.

Website Link:

<https://cdnbbsr.s3waas.gov.in/s3850af92f8d9903e7a4e0559a98ecc857/uploads/2021/04/2021042919.pdf>

Ministry of AYUSH releases fresh COVID-19 Guidelines to fight out the second wave

Responding to the need of fresh guidelines in the face of the emergence of the second wave of the pandemic, Ministry of AYUSH has released today the revised guidelines for Ayurveda and Unani practitioners for COVID-19 patients in home isolation and Ayurveda and Unani preventive measures for self-care during COVID-19 pandemic. The main focus is on self-care and home management of COVID-19, as the vast majority of COVID-affected families in the country are forced to negotiate the pandemic out of hospitals.

These guidelines for self-care are based on leads from classical Ayurveda and Unani texts, outcome of research studies and report and recommendations of the interdisciplinary committee and which will further strengthen the fight in combating COVID-19 in the emerging situation.

The present Guidelines and self-care measures provide clear guidance to Ayurveda and Unani practitioners regarding treatment of COVID-19 patients in different conditions of infection. This brings in uniformity and consistency in the Ayush-based responses to the pandemic across the country. It also helps State/UT Governments to plan and incorporate these solutions into the COVID-19 management activities being deployed on the ground. Furthermore, these measures and guidelines contribute to the mainstreaming of Ayush solutions for the management of COVID-19 and will be immensely beneficial to the public since these solutions are easily accessible. These will also help in alleviating the hardships brought in by the pandemic.

These are aimed to increase awareness among the citizens regarding effective home care solutions and recommended Ayush practices, to help them to enhance their immunity along with standard guideline for Ayurveda and Unani practitioners for management of prophylactic, asymptomatic and mild cases of COVID-19 during home isolation.

Website Link: <https://main.ayush.gov.in/event/guidelines-ayurveda-unani-practitioners-covid-19-patients-home-isolation-and-ayurveda-unani>

The detailed information with respective links of the specific guidelines for COVID-19 patients in home isolation and self-care are:

- 1. Guidelines for Ayurveda Practitioners for COVID-19 Patients in Home Isolation:**
<https://main.ayush.gov.in/event/guidelines-ayurveda-practitioners-covid-19-patients-home-isolation>
- 2. Ayurveda Preventive Measures for Self-care during COVID-19 Pandemic:**
<https://main.ayush.gov.in/event/ayurveda-preventive-measures-self-care-during-covid-19-pandemic>
- 3. Guidelines for UNANI Practitioners for COVID-19 Patients in Home Isolation:**
<https://main.ayush.gov.in/event/guidelines-unani-practitioners-covid-19-patients-home-isolation>
- 4. Unani Medicine-based Preventive Measures for Self-care during COVID-19 Pandemic:**
<https://main.ayush.gov.in/event/unani-medicine-based-preventive-measures-self-care-during-covid-19-pandemic>

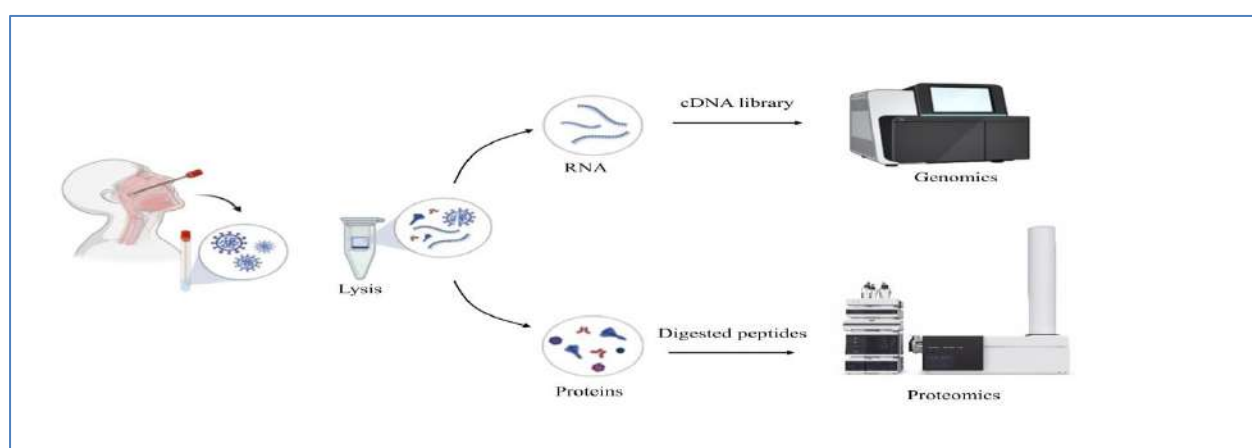
RESEARCH STORIES

New mutations and proteins of novel coronavirus revealed by IISc team

A recent study from the Indian Institute of Science (IISc), published in the Journal of Proteome Research, has identified multiple mutations and unique proteins in isolates of SARS-CoV-2, the virus that causes COVID-19. It has also shown that the host produces several proteins of their own as their body launches an immunological defense in response to the viral attack.

COVID-19 has claimed over 2.5 million lives in just over a year. Humanity continues to face new challenges with novel strains – or genetic variants – of the virus being reported from around the world. To better understand how the virus is mutating and its protein biology (proteins are made using genetic information), an IISc team led by Utpal Tatu, Professor in the Department of Biochemistry, has carried out a comprehensive “proteo-genomic” investigation – a series of analyses of SARS-CoV-2 isolates. The isolates or viral samples were recovered from nasal secretions of consenting COVID-19-positive individuals in Bengaluru.

The genomic analysis was done using what molecular biologists like Tatu call next generation sequencing (NGS), a technology that allows for rapid sequencing of the entire genome. He says that sequencing the genomes of viral strains from around the world is important because it helps keep track of mutations that are arising constantly. His team’s analysis suggests that the virus is now mutating faster than before – the three Bengaluru isolates had 27 mutations in their genomes with over 11 mutations per sample, more than both the national average and global average.



Contact Info: tatu@iisc.ac.in

Website link: <https://www.iisc.ac.in/events/new-mutations-and-proteins-of-novel-coronavirus-revealed-by-iisc-team/>

Evidence of presence of SARS-CoV-2 virus in atmospheric air and surfaces of dedicated COVID-19 hospital

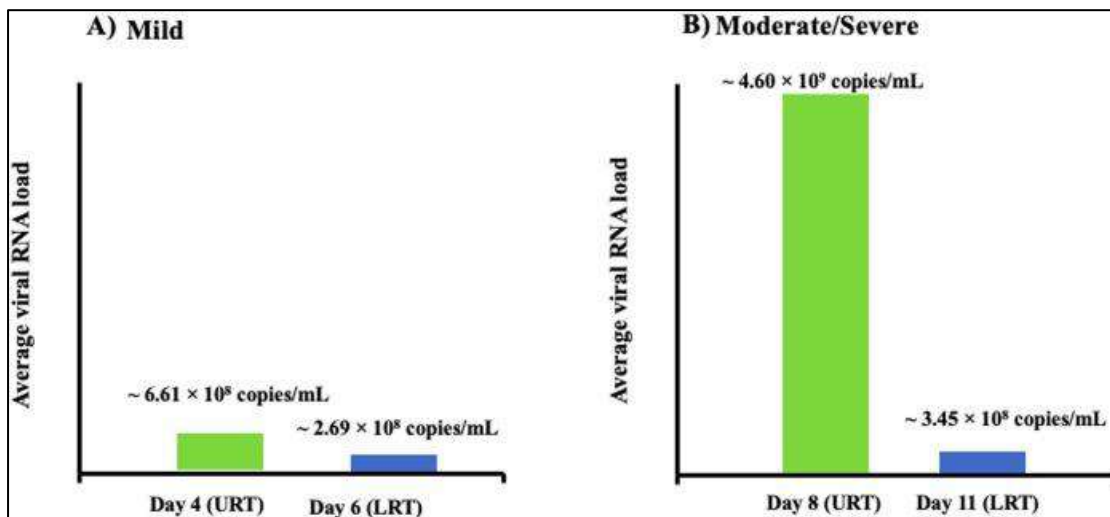
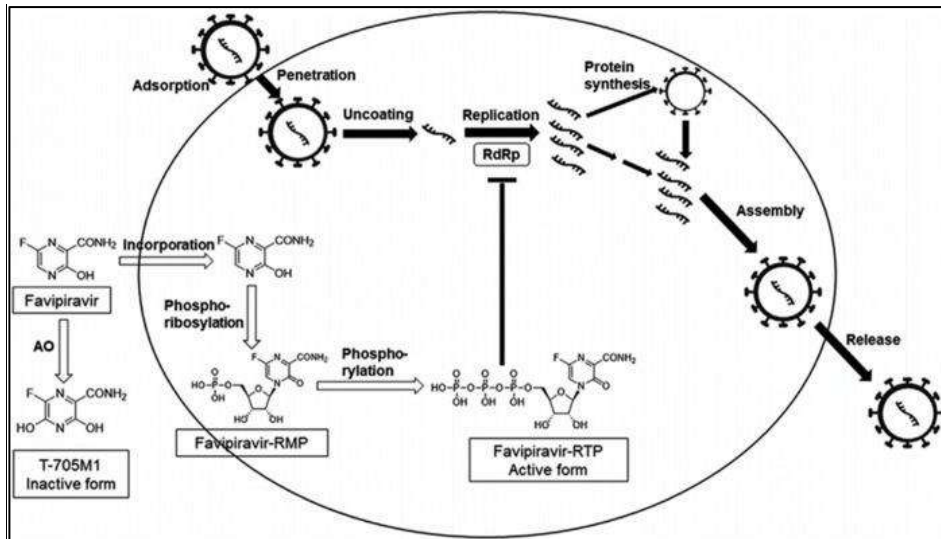
A collaborative study was conducted by the Departments of Biochemistry, Microbiology, Maulana Azad Medical College in collaboration with the Departments of Medicine and Anaesthesia, Lok Nayak Hospital (LNH), and CSIR-National Physical Laboratory, New Delhi during 1 July 2020 to 25 September 2020 to provide evidences for the presence of SARS-CoV-2 virus in atmospheric air and surfaces of the hospital wards. Swabs from hospital surfaces (patient's bed, ward floor and nursing stations area) and suspended particulate matters in ambient air were collected by a portable air sampler from medicine ward, ICU and emergency ward admitting COVID-19 patients. By performing RT-PCR for E-gene and RdRp gene, SARS-CoV-2 virus was detected from hospital surfaces and particulate matters from ambient air of various wards collected at 1 and 3 meter distance from active COVID-19 patients. Presence of the virus in air beyond 1 meter distance from the patients and surfaces of hospital indicates that SARS-CoV-2 virus has potential to be transmitted by airborne and surface routes from COVID-19 patients to healthcare workers working in dedicated COVID-19 hospital. This warrants that precautions against airborne and surface transmission of COVID-19 in community should be taken when markets, industries, educational institutions etc. reopen for normal activities.

Contact Info: tuhin@nplindia.org, bckoner@hotmail.com

Website Link: <https://pubmed.ncbi.nlm.nih.gov/33913527/>;
<https://onlinelibrary.wiley.com/doi/10.1002/jmv.27029>

Role of Favipiravir in the treatment of COVID-19

The coronavirus disease-2019 (COVID-19) outbreak all over the world has led the researchers strive for developing drugs or vaccines to prevent or halt the progression of this ailment. To hasten the treatment process, repurposed drugs are being evaluated. Favipiravir is one such oral drug that was approved for new and re-emerging pandemic influenza in Japan in 2014 and has shown potent in vitro activity against severe acute respiratory syndrome coronavirus-2. It has a wide therapeutic safety margin indicated by a wide CC50/EC50 ratio for a high dose. From the clinical studies in COVID-19, it has shown rapid viral clearance as compared to Lopinavir/Ritonavir (LPV/RTV) and superior recovery rate than umifenovir. Overall, Favipiravir has shown promising results in clinical studies in China, Russia, and Japan, and more trials are underway in multiple countries, including USA, UK, and India. Recently, treatment guidelines from many countries and some states from India have included Favipiravir in the treatment protocol. This review provides insights into the evidence-based evolving role of Favipiravir in the management of COVID-19 infection with emphasis on benefits of initiating an early antiviral therapy with special focus on Favipiravir, its pharmacodynamic, pharmacokinetic, in vitro, clinical data, and inclusion in the treatment protocols of COVID-19.



Contact Info: saiprasad.patil@glenmarkpharma.com

Website Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7831863/>

THSTI researchers find promising vaccine candidate against SARS-CoV-2

Translational Health Science and Technology Institute (THSTI) worked on the SARS-CoV-2, the causative agent of COVID-19 that has proven to be a threat to the human race globally. The receptor binding domain of the spike protein of coronavirus has multiple neutralizing epitopes and is associated with viral entry. A team of researchers has designed and characterized the SARS-CoV-2 spike protein fragment (330-526) as Receptor Binding Domain (RBD330-526) with two native glycosylation sites (N331 and N343); as a potential subunit vaccine candidate. The team initially characterized the RBD330-526 biochemically and investigated its thermal stability, humoral and T cell immune response of various RBD protein formulations (with or without adjuvant) to evaluate the inherent immunogenicity and

immunomodulatory effect. Their result showed that the purified RBD immunogen is stable up to 72 hours, without any apparent loss in affinity or specificity of interaction with the ACE2 receptor. Upon immunization in mice, RBD generates high titer humoral response, elevated IFN- γ producing CD4+ cells, cytotoxic T cells and robust neutralizing antibodies against live SARS-CoV-2 virus. The results collectively support the potential of RBD330-526 as a promising vaccine candidate against the SARS-CoV-2.

Contact Info: tripti@thsti.res.in

Website link: <https://www.frontiersin.org/articles/10.3389/fimmu.2021.641447/abstract>;
<https://thsti.res.in/publications.php>

Ritonavir may inhibit exoribonuclease activity of nsp14 from SARS-CoV-2

SARS-CoV-2 is the causative agent for the on-going COVID-19 pandemic. The nsp14 protein of SARS-CoV-2 houses a 3' to 5' exoribonuclease activity responsible for removing mismatches that arise during genome duplication. A team of researchers at Regional Centre for Biotechnology, Faridabad worked on a homology model of nsp10-nsp14 complex to carry out in silico screening to identify molecules among natural products or FDA-approved drugs that can potentially inhibit the activity of nsp14. This exercise showed that ritonavir might bind to the exoribonuclease active site of the nsp14 protein. A model of the SARS-CoV-2-nsp10-nsp14 complex bound to substrate RNA showed that the ritonavir binding site overlaps with that of the 3' nucleotide of substrate RNA. A comparison of the calculated energies of binding for RNA and ritonavir suggested that the drug may bind to the active site of nsp14 with significant affinity. It is, therefore, possible that ritonavir may prevent association with substrate RNA and thus inhibit the exoribonuclease activity of nsp14. Overall, the computational studies suggest that ritonavir may serve as an effective inhibitor of the nsp14 protein. nsp14 is known to attenuate the inhibitory effect of drugs that function through premature termination of viral genome replication. Hence, ritonavir may potentiate the therapeutic properties of drugs such as Remdesivir, Favipiravir and Ribavirin.

Contact Info: Deepak@.res.in

Website link:
[https://pubmed.ncbi.nlm.nih.gov/33309661/#:~:text=nsp14%20is%20known%20to%20attenuate,as%20remdesivir%2C%20favipiravir%20and%20ribavirin](https://pubmed.ncbi.nlm.nih.gov/33309661/#:~:text=nsp14%20is%20known%20to%20attenuate,as%20remdesivir%2C%20favipiravir%20and%20ribavirin;);
https://www.rcb.res.in/index.php?param=research/2021_p

RCB-Faridabad published article on in silico characterization of mutations circulating in SARS-CoV-2 structural proteins

SARS-CoV-2 emerged as the causative agent for the COVID-19 pandemic that has caused more than 2.4 million deaths worldwide. Since the onset of infections, several full-length sequences of viral genome have been made available which have been used to gain insights into viral dynamics. A team of researchers at Regional Centre for Biotechnology, Faridabad utilised a meta-data driven comparative analysis tool for sequences (Meta-CATS) algorithm to identify mutations in 829 SARS-CoV-2 genomes from around the world. The algorithm predicted sixty-one mutations among SARS-CoV-2 genomes. The team observed that most of the mutations were concentrated around three protein-coding genes viz. nsp3 (non-structural protein 3), RdRp (RNA-directed RNA polymerase) and Nucleocapsid (N) proteins of SARS-CoV-2. The team used various computational tools including normal mode analysis (NMA), C- α discrete molecular dynamics (DMD), and all-atom molecular dynamic simulations (MD) to study the effect of mutations on functionality, stability, and flexibility of SARS-CoV-2 structural proteins including envelope (E), N, and spike (S) proteins. PredictSNP predictor suggested that four mutations (L37H in E, R203K and P344S in N and D614G in S) out of seven were predicted to be neutral while the remaining ones (P13L, S197L and G204R in N) were predicted to be deleterious in nature thereby impacting protein functionality. NMA, C- α DMD and all-atom MD suggested some mutations to have stabilizing roles (P13L, S197L and R203K in N protein) where remaining ones were predicted to destabilize mutant protein. In summary, they identified significant mutations in SARS-CoV-2 genomes as well as used computational approaches to further characterize the possible effect of highly significant mutations on SARS-CoV-2 structural proteins.

Contact Info: kinshuk@rcb.res.in

Website link: [https://pubmed.ncbi.nlm.nih.gov/33797336/;](https://pubmed.ncbi.nlm.nih.gov/33797336/)

https://www.rcb.res.in/index.php?param=research/2021_p

SIGNIFICANT EFFORTS

IISc develops Mini-COVIDNet, a mobile-friendly point-of-care detection model of COVID-19

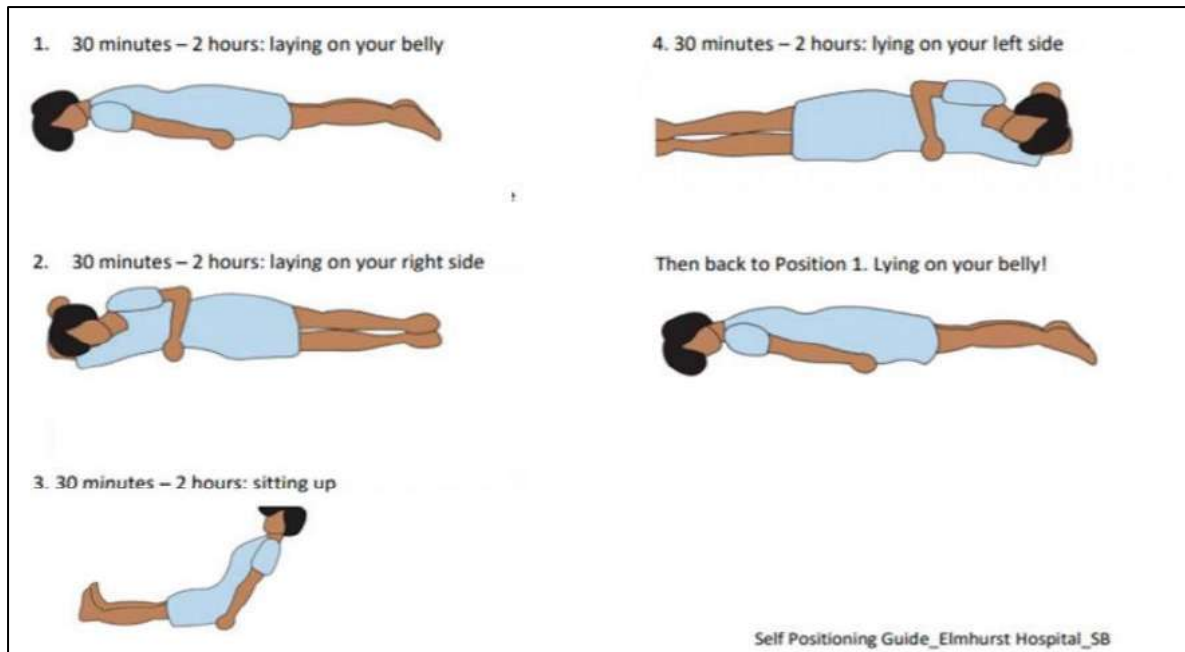
Lung ultrasound imaging has the potential to be an effective point-of-care test for detection of COVID-19, due to its ease of operation with minimal personal protection equipment along with easy disinfection. The current state-of-the-art deep learning models for detection of COVID-19 are heavy models that may not be easy to deploy in commonly utilized mobile platforms in point-of-care testing. In this work, a team of researchers at Indian Institute of Science, Bangalore developed a light weight, mobile-friendly efficient deep learning model for detection of COVID-19 using lung ultrasound images. The developed method was shown to be sensitive to the damage to the pleural surface of the lung, which has been proven to have prognostic value, commonly observed in intensive care unit–admitted and deceased patients. The developed model has utility in the context of a massive COVID-19 pandemic, where it can better triage patients with pulmonary symptoms (suspected of infection).

Contact Info: yalavarthy@iisc.ac.in

Website link: <https://www.iisc.ac.in/events/mini-covidnet-mobile-friendly-point-of-care-detection-of-covid19-using-ultrasound-images/>

MoHFW advises Proning for self-care

The Ministry of Health and Family Welfare has advised 'proning for self-care' for coronavirus patients. It states that it is very much beneficial for such patients who have compromised breathing comfort, especially during home isolation. The ministry, in a document, also said proning is the process of turning a patient with precise, safe motions, from their back onto their abdomen so that the individual is lying face down and it is medically accepted position to improve breathing comfort and oxygenation.



Website Link:

<https://cdnbbsr.s3waas.gov.in/s3850af92f8d9903e7a4e0559a98ecc857/uploads/2021/04/2021042386.pdf>

Multilayer masks most effective at preventing aerosol generation: IISc

When a person coughs, large droplets (>200 microns) hit the inner surface of a mask at a high speed, penetrate the mask fabric and break up or “atomise” into smaller droplets, which have a greater chance of aerosolisation and thereby carrying viruses like SARS-CoV-2 with them, according to a new study led by researchers at the Indian Institute of Science (IISc).

Using a high-speed camera, a team of researchers at Indian Institute of Science Bangalore closely tracked individual cough-like droplets impinging on single-, double- and multi-layered masks, and noted the size distribution of the “daughter” droplets generated after penetration through the mask fabric. For single- and double-layered masks, most of these atomised daughter droplets were found to be smaller than 100 microns, with the potential to become aerosols, which can remain suspended in the air for a long time and potentially cause infection.

Triple-layered masks – even those made of cloth – and N95 masks were found to successfully prevent atomisation, and therefore offered the best protection. The researchers, however, clarify that when such masks are unavailable, even single-layered masks may offer some protection and hence must be used wherever mandated by health officials.

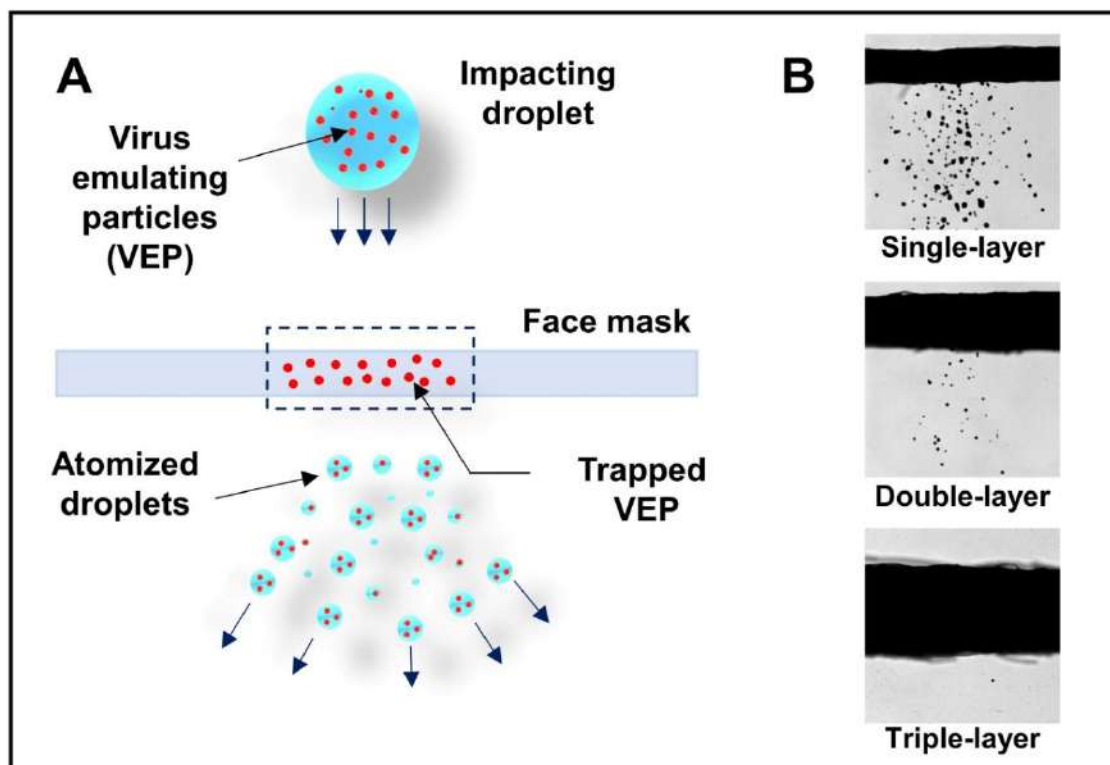
The team used a pulsed laser to cast shadows of the droplets and a camera and zoom lens to capture images at high speeds (20,000 frames per second). Apart from surgical masks, some

locally sourced cloth masks were also tested. The team also investigated the effects of varying the speed at which the droplet is ejected and the impingement angle.

They found that single-layered masks could only block 30% of the initial droplet volume from escaping. Double-layered masks were better (about 91% was blocked), but more than a quarter of the daughter droplets that were generated were in the size range of aerosols. Droplet transmission and generation was either negligible or zero for triple-layered and N95 masks.

The team also dispersed fluorescent nanoparticles of the same size as the virus in the artificial cough droplets to show how these particles can get entrapped in the mask fibres, underscoring the importance of disposing the masks after use.

The study was carried out in collaboration with scientists Abhishek Saha in UC San Diego and Swetaprovo Chaudhuri in University of Toronto Engineering. The researchers hope to pursue further studies using a full-scale patient simulator that would also allow tracking multiple droplets. “Studies are also going on to propose more robust models to understand how this atomisation is actually taking place,” says Saptarshi Basu, Professor in the Department of Mechanical Engineering and senior author of the study published in Science Advances. “This is a problem not just for COVID-19, but for similar respiratory diseases in the future as well.”



Contact Info: sbasu@iisc.ac.in; shubhams12@iisc.ac.in

Website link: <https://www.iisc.ac.in/events/multilayer-masks-most-effective-at-preventing-aerosol-generation/>

Phase 3 Clinical Trial of COVAXIN, developed by ICMR & Bharat Biotech, shows 81% efficacy

Phase 3 trial results of the COVAXIN, developed by the Indian Council of Medical Research (ICMR) in partnership with Bharat Biotech International Limited (BBIL), have shown an interim vaccine efficacy of 81% in preventing COVID-19. The Phase 3 trial, jointly initiated by ICMR and BBIL in mid-November 2020, was conducted in a total of 25,800 individuals across 21 sites. The interim efficacy trend of 81%, analysed as per the protocol approved by the DCGI, puts it at par with other global front-runner vaccines.

Contact Info: dr Gupta nivedita@gmail.com, sharma.lk@icmr.gov.in

Website Link:

https://www.icmr.gov.in/pdf/press_release_files/Press_Release_ICMR_03_March_2021.pdf

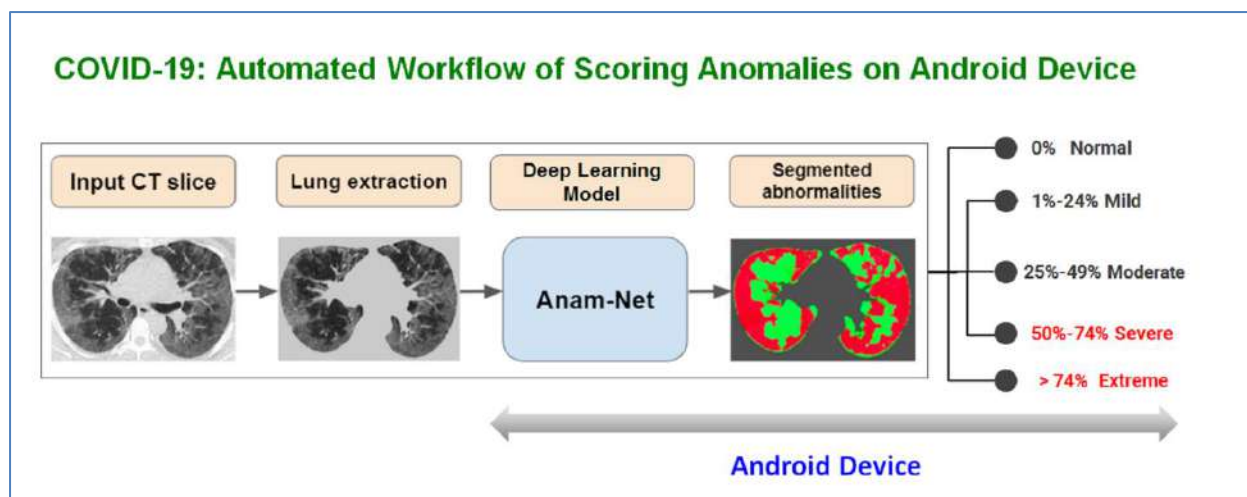
IISc develops AI-based software tool for automated diagnosis of COVID-19 lung infection

A new software tool that reveals the severity of lung infections in COVID-19 patients has been developed by researchers from the Departments of Computational and Data Science (CDS) and Instrumentation and Applied Physics at the Indian Institute of Science (IISc), in collaboration with colleagues from the Oslo University Hospital and the University of Agder in Norway.

COVID-19 can cause severe damage to the respiratory systems, especially the lung tissues. Image-based methods such as X-ray or CT scans can prove helpful in determining how bad the infection is.

The software tool developed by the IISc-led team, called AnamNet, can ‘read’ the chest CT scans of COVID-19 patients, and, using a special kind of neural network, estimate how much damage has been caused in the lungs, by searching for specific abnormal features. Such a tool can provide automated assistance to doctors and therefore help in faster diagnosis and better management of COVID-19.

AnamNet employs deep learning and other image processing techniques, which have now become integral to biomedical research and applications. The software can identify infected areas in a chest CT scan with a high degree of accuracy. The researchers trained AnamNet to look for abnormalities and classify areas of the lung scan as either infected or not infected – this is called ‘segmentation’. The tool can judge the severity of the disease by comparing the extent of infected area with healthy area.



Key steps in the proposed approach for automated segmentation of abnormalities/anomalies in chest CT images

The study also compared AnamNet’s performance with other state-of-the-art software tools which perform similar tasks. It not only matched its peers in its accuracy but also performed just as well using fewer parameters. The neural network was also computationally less complex, which allowed the researchers to train it much faster to detect anomalies.

AnamNet holds promise beyond merely identifying lung infections in COVID-19 patients. “We are currently focusing on making our software more robust to handle COVID-19 scans, but we are also looking to diversify to other common lung diseases like pneumonia, fibrosis and even lung cancer in the near future,” Phaneendra Yalavarthy, Associate Professor at CDS says. He suggests that with some changes to the present design, the software could even be used to read brain scans.

Contact Info: yalavarthy@iisc.ac.in; naveenp@iisc.ac.in

Website link: <https://www.iisc.ac.in/events/ai-based-software-tool-for-automated-diagnosis-of-covid-19-lung-infection/>

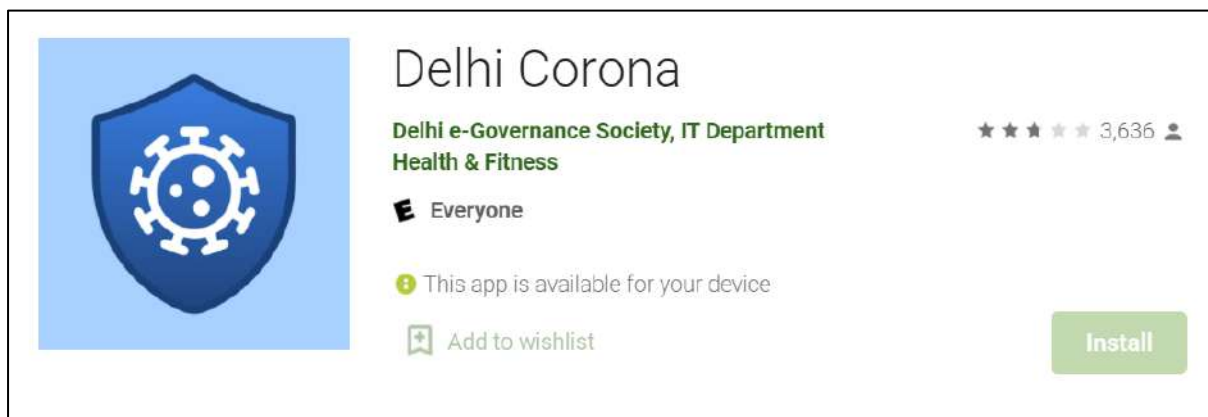
COVID-19: Maharashtra Government teams up with CSIR-IGIB for mutant tracking

The Maharashtra Government has signed a Memorandum of Understanding (MoU) with the Council of Scientific and Industrial Research (CSIR)-Institute of Genomics and Integrative Biology (IGIB) for SARS-CoV-2 genome sequencing. This move is along the lines of the Kerala Government, which had launched a genome sequencing program to study the mutation of the novel coronavirus better and validate the policies implemented to contain its transmission.

Website link: <https://www.csir.res.in/sites/default/files/26%20To%2030%20April%202021.pdf>

'Delhi Corona App' updated to serve in current crisis

The Delhi government has updated its Corona app, which was launched in early 2020, to help track availability of hospital beds and ventilators for COVID-19 patients, schedule vaccine doses, and more. The updated Delhi Corona app is serving to access e-pass for emergency travelling, booking for vaccination, information regarding beds in Delhi government hospitals, for plasma and many other health-related services.



Website Link:

https://play.google.com/store/apps/details?id=com.delhi.covidcare&hl=en_IN&gl=US

CSIR-IIP, Dehradun designs oxygen enrichment units that can generate 500 litres per minute

In an effort to provide an inexhaustible supply of oxygen to hospitals, the Council of Scientific and Industrial Research-Indian Institute of Petroleum (CSIR-IIP), Dehradun has developed oxygen enrichment units that can generate up to 500 litres per minute of medical-grade oxygen.



Website link: https://covid19csir.urdip.res.in/control?_nws

AFMS to import oxygen generation plants from Germany to tide over current surge in COVID-19 cases

Armed Forces Medical Services (AFMS) has decided to import oxygen generation plants and containers from Germany, amid shortage of oxygen in the hospitals during the second wave of COVID-19 across the country. Twenty-three mobile oxygen generation plants are being airlifted from Germany that will be deployed in AFMS hospitals catering to the COVID-19 patients.

Each plant has a capacity to produce 40 litres of oxygen per minute and 2,400 litres an hour. At this rate, it can cater to 20-25 patients round the clock. The advantage of these plants is that they are easily portable.

Website link:

[https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713573#:~:text=MoD%20giving%20extension%20to%20SSC%20Doctors%20in%20AFMS%20till%20December%2031%2C%202021&text=Armed%20Forces%20Medical%20Services%20\(AFMS,Covid%2D19%20across%20the%20country.](https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713573#:~:text=MoD%20giving%20extension%20to%20SSC%20Doctors%20in%20AFMS%20till%20December%2031%2C%202021&text=Armed%20Forces%20Medical%20Services%20(AFMS,Covid%2D19%20across%20the%20country.)

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 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-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 also 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>

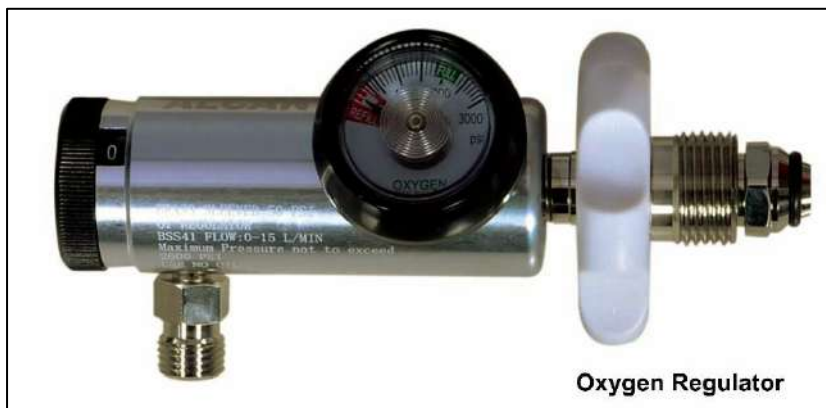
DRDO develops SpO₂-based Supplemental Oxygen Delivery System: A boon in current COVID-19 pandemic

Defence Research and Development Organisation (DRDO) has developed SpO₂ (Blood Oxygen Saturation) supplemental Oxygen Delivery System for soldiers posted at extreme high-altitude areas. Developed by Defence Bio-Engineering & Electro Medical Laboratory (DEBEL), Bengaluru of DRDO, the system delivers supplemental oxygen based on the SpO₂ levels and prevents the person from sinking in to a state of Hypoxia, which is fatal in most cases, if sets in. This automatic system can also prove to be a boon during the current COVID-19 situation.

Hypoxia is a state in which the amount of oxygen reaching the tissues is inadequate to fulfil all the energy requirements of the body. This is exactly the situation that gets replicated in a COVID-19 patient due to the virus infection and has been a leading factor in the current crisis.

The electronic hardware of the system is designed for functioning at extreme altitudes featuring low barometric pressures, low temperatures, and humidity. The software safety checks incorporated into the system are critical in ensuring the functional reliability of the system in field conditions.

The system is a boon in the current pandemic as it can be used in the household for moderate COVID-19 patients for Oxygen flow therapy with flow controlled at 2/5/7/10 lpm flow. The automatic usage has huge advantage in the household, as the oximeter would give an alarm for lower SpO₂ value. It will automatically increase/decrease the O₂ flow based on SpO₂ setting which can be auto adjusted at 2, 5, 7, 10 lpm flow rate. The optimal O₂ flow rate conserves the O₂ resources/O₂ management and greatly increases the endurance.



With its availability and simple-to-use facility by a common person, the system shall greatly reduce the workload and exposure time of doctors and paramedics to monitor the SpO₂ levels of the patient. The automated Calibrated Variable Flow Control for Low O₂ levels (User preset, <90%, <80%) through a calibrated Proportional Flow Control Valve (PFCV) will facilitate in economising the oxygen supply (1-10 lpm with ± 0.5 lpm). A moderate COVID-19 patient requires O₂ supply 10Litre/150bar–10kg–1500 litres which can sustain up to 750 minutes.



This automated, easy-to-use Oxygen Delivery System now available is a great boon, particularly in these critical times when medical resources are stretched to their limits. Its proliferation would mitigate the crisis in management of such huge number of COVID-19 patients in many ways all across the country.

Website link:

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1712666>

Steel Sector produced 3474 MT of Liquid Medical Oxygen supply in the country

Under the guidance and direction of Union Steel Minister Shri Dharmendra Pradhan, Public Sector Undertakings, under the Ministry of Steel and other private companies in the steel sector in this hour of need are with the nation and continuing their best to supplement the efforts of the Government in making available Liquid Medical Oxygen.

Total daily Medical Oxygen production capacity of steel plants is 2834 MT. In the steel sector, there are 33 oxygen plants of which 29 are tapped regularly. As against 2834 MT of daily LMO production capacity in the Ssteel sector, the production of LMO is 3474 MT as reported on 24 April 2021. This is higher than the LMO production capacity because most units have reduced the production of nitrogen and argon and only producing LMO. With all these efforts, 2894 tonnes were dispatched to different states on 24 April by steel plants in public and private sector as against 1500/1700 Metric Tonnes/day a week earlier.

Steel plants require gaseous oxygen primarily for steel making and for oxygen enrichment in Blast Furnaces, apart from some general purposes like lancing and gas cutting. Hence, Captive Oxygen Plants in integrated steel plants are designed to produce primarily gaseous products of oxygen, nitrogen and argon and then routed through Pressure Reduction & Management System (PRMS) to meet the process need at desired pressure. Such plants can produce 5-6% maximum Liquid Oxygen (LOX) at the peak capacity, which is a highly pure product compared to the industrial oxygen. The plants can only optimize LOX production by sacrificing some gaseous oxygen and optimize process parameters.

In the meantime, all out efforts are being made to enhance the production of liquid oxygen and for dispensing the same for which all oxygen plants whether in private or public are working 24x7 and dispensing oxygen. Steel plants are also filling oxygen cylinders and supplying to the states/hospitals.



Website link: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713956>

COVID COMMUNICATION & RESOURCES

MyGov developed dashboard for the COVID resources

With the second wave of COVID-19 hitting the nation, MyGov has developed dashboard with support from Sprinklr, so the people who are currently overwhelmed and struggling to find relevant information on what to do and what measures to take if they or someone they know is affected by the virus.

However, since most of the information on the links is being updated real time by dedicated individuals who are doing their best to share knowledge – it is requested to verify the same and in case any information is found to the contrary, the same should be informed to MyGov.



Website link:

https://self4society.mygov.in/covid-resources/?utm_source=MyGov&utm_medium=MyGovCovid-19

ESIC starts COVID-19 facility dashboard

Ministry of Labour and Employment informed that the Employees' State Insurance Corporation (ESIC) has started an online dashboard to show the number of beds available at its ESI hospitals.



COVID 19 FACILITY DASHBOARD

Current Date and Time : 01/05/2021 20:27:12 Hrs

Dedicated COVID Hospital
 Designated COVID + Non COVID Hospital

S.NO	GET DIRECTION	HOSPITAL / ESTABLISHMENT NAME	LEVEL OF COVID CARE	GRAND TOTAL BEDS (GENERAL + ICU + HDU)	OCCUPIED BEDS	VACANT BEDS	DETAILED BREAK-UP	LAST UPDATED
1		ESI HOSPITAL ADITYAPUR	I	28	10	18	VIEW	01 May 2021 09:55:58
2		ESIC HOSPITAL & MEDICAL COLLEGE ALWAR	II	40	14	26	VIEW	01 May 2021 15:52:44
3		ESIC-HOSPITAL-BAREILLY	I	50	11	39	VIEW	01 May 2021 09:40:26
4		ESIC HOSPITAL BHIWADI	II	50	17	33	VIEW	01 May 2021 18:09:02
5		ESIC HOSPITAL BIBVEWADI	III	100	39	61	VIEW	01 May 2021 15:43:07

Website link: <https://www.esic.in/Dashboard/CovidDashboard.aspx>

Indian Institute of Technology (IIT) Delhi publishes regular 'NEWS CLIPS' covering all kinds of information related to COVID-19

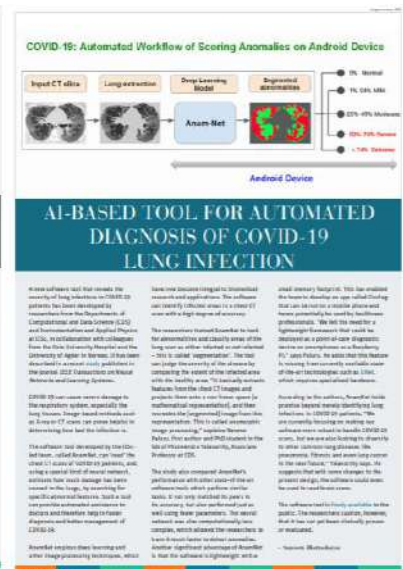
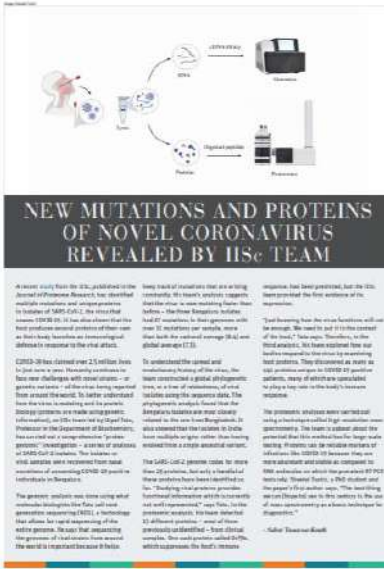
Indian Institute of Technology (IIT), Delhi published a document named 'News Clip' covering all issues that occur in IIT Delhi. It also covers scientific research and efforts on COVID-19 during the month of April. This News Clip document contains information about all startups, joint research projects of IIT-D, COVID-19 care facility, Delhi Corona App, New research on COVID-19, and many more.

Website Link:

<https://library.iitd.ac.in/sites/default/files/2021-04/News%20Clips%2C%20April%201-30%2C%202021.pdf>

KERNEL – Special COVID-19 research newsletter – published from IISc

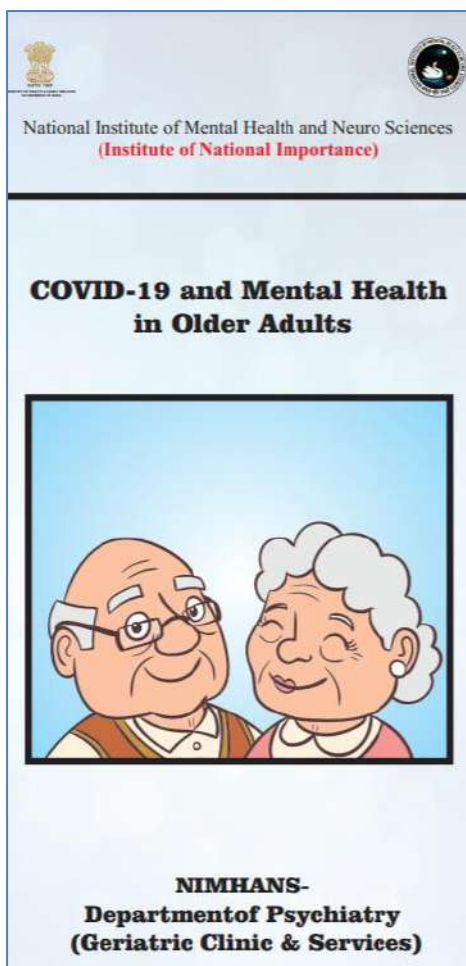
The Indian Institute of Science (IISc) is India's premier destination for science and engineering. Research at IISc spans six divisions and is distinctively interdisciplinary. Kernel was launched as an annual magazine to showcase the Institute's significant research contributions. Kernel - special COVID-19 newsletter was published as a monthly digest in its new avatar, providing snapshots of recent research and initiatives.



Website link: <https://www.iisc.ac.in/wp-content/uploads/2021/04/Kernel-Issue-4-2021.pdf>

COVID-19 and Mental Health in Older Adults, a source book released by NIMHANS-Bengaluru

The rapid transmission of COVID-19 pandemic outbreak, higher mortality rate, self-isolation, social-distancing and quarantine could exacerbate the risk of mental health problems. NIMHANS released a brochure about COVID-19 and mental health in older adults.



Website link:

<https://nimhans.ac.in/wp-content/uploads/2021/03/COVID-19-and-Mental-Health-in-Older-Adults.pdf>

Press Information Bureau releases daily bulletin on COVID-19

Press Information Bureau (PIB), Government of India released a daily bulletin on COVID-19, starting from early days of COVID-19 outbreak. The bulletin contains press releases concerning COVID-19, issued in last 24 hours, inputs from PIB field offices and fact checks undertaken by PIB. These bulletins are published in 14 languages, namely Hindi, English, Urdu, Marathi, Telugu, Tamil, Punjabi, Bangla, Kannada, Oriya, Gujarati, Assamese, Malayalam and Manipuri.



Website link: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1715709>

ॐ