VOL. V | ISSUE 4

Vigyan Prasar

MONTHLY EDITION | MARCH 2022

COVID-19

Science & Technology Efforts in India

In the face of adversity we have a choice - stay updated with scientific facts

COVID REPOSITORY

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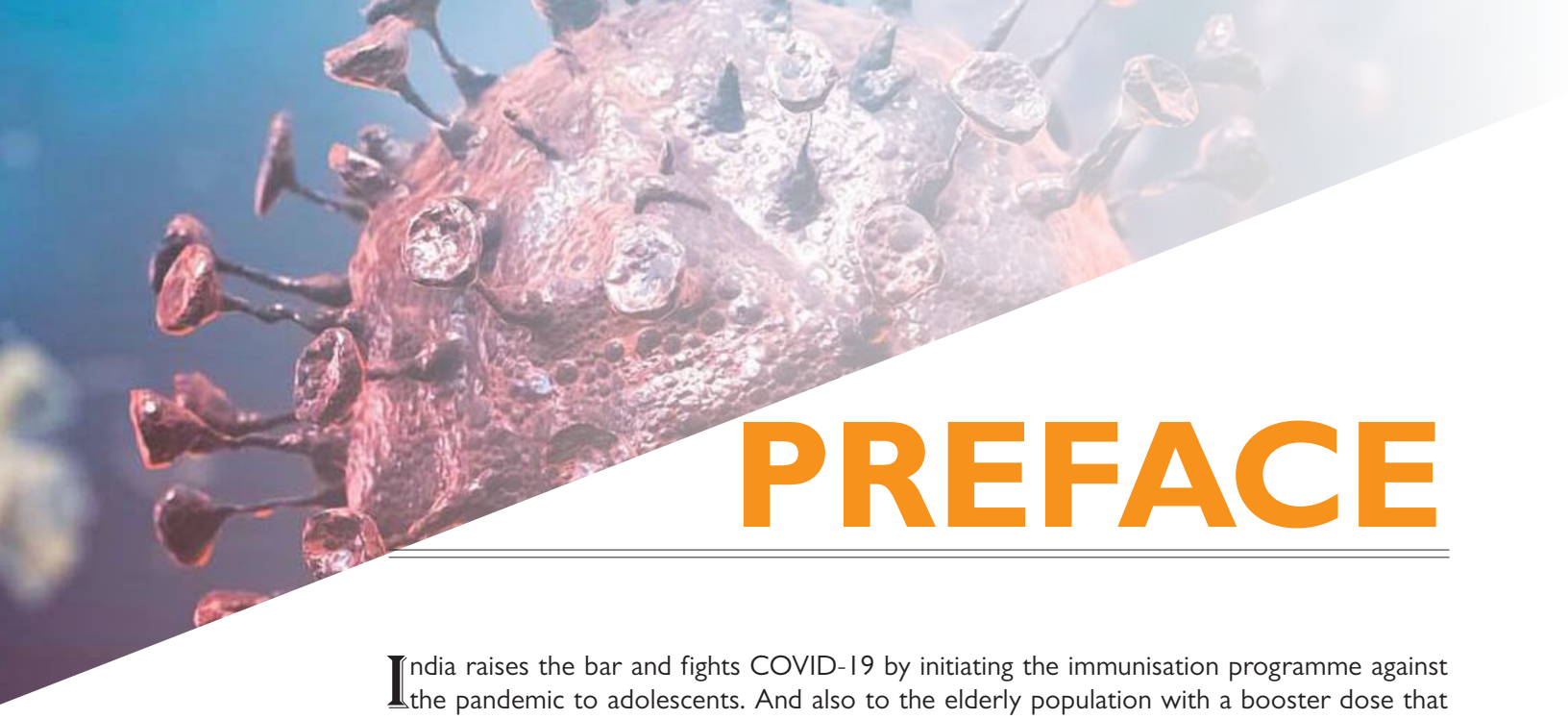
INDIA SCIENCE, TECHNOLOGY & INNOVATION (ISTI) PORTAL

Reflecting Science, Technology & Innovation in India



PREFACE

India raises the bar and fights COVID-19 by initiating the immunisation programme against the pandemic to adolescents. And also to the elderly population with a booster dose that increases the community's immunity in a (w)holistic way. The advent of new medicine – Vincov-19 – also holds promise to the fragile nature of the spread and transmission mechanism of the disease. In some ways, our collective destiny is intertwined with India's. And this comes with collective responsibility. Public participation is a powerful medium for realising all of a nation's hopes and dreams. India demonstrated great fortitude by using collective strength to pull herself out of trouble.

The current edition focuses on various impactful initiatives to mitigate the pandemic and recent developments in S&T to apprise the scientific fraternity, like research outputs, communications & resources, and fact-check questionnaires. We continue compiling new information related to the pandemic to sensitise our readers about COVID-related latest developments, to inform the readers and strengthen the usefulness of the information. This edition also includes a trending story on the contribution of a thematic institute mandated to work collectively in a consortium to devise and design various ways and aspects to mitigate the pandemic and its spread.

Last but not least, we advise all our readers to stay guard, with COVID-Appropriate-Behaviours (CABs) against the pandemic as the onset of summers had triggered the nationwide COVID transmission wave in the last two subsequent years. This year, it holds more significance as schools are opening completely offline, that is, physical mode, after a gap of two inconsistent years of education and education methodologies.

Hopefully, the coverage about how the country is overcoming challenges with the help of knowledge will instil confidence and trust in the country's scientists, eventually inculcating scientific temper among the general public. We look forward to suggestions and feedback from our readers at covidnewsletter@vigyanprasar.gov.in.

March 2022

Vigyan Prasar

New Delhi

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

INDEX

1

TRENDING IN INDIA @COVID-19 PANDEMIC

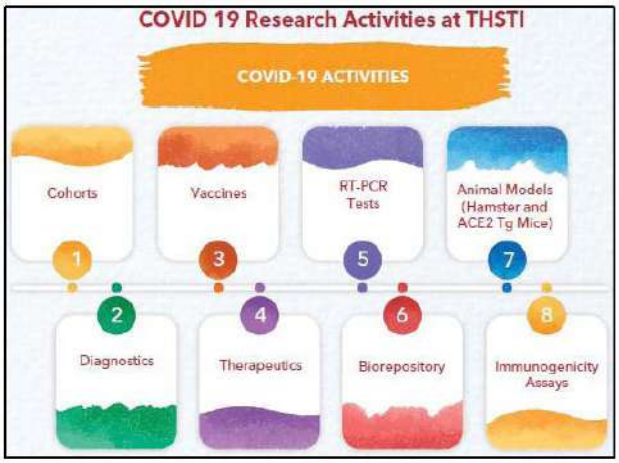
The strategy for this section is to fill the gap area identified and as per the popular demand risen from the reader database. The communication stories compiled here are signature science stories related to the COVID-19 pandemic. The featured stories cover amongst ongoing research, recognised innovations, developed technologies/products/services, recent trends about variants-of-concern, the trend in diagnostics & prognostics, trend analysis of therapeutic regimens, communicating science & generating awareness, the contribution of a specific organisation in COVID warfare, the role of startups/private sectors in COVID mitigation, or any other relevant/significant related topic.

SECTION GUIDELINES

Efforts of THSTI in mitigating COVID-19

Efforts of THSTI in mitigating COVID-19

In the beginning of 2020, when SARS-CoV-2 virus infection started affecting the countries globally, nobody had imagined that a pandemic of such a scale, which infected more than 440 million people and resulted in >6 million deaths will affect all of us. It was a challenge for the nations to stand up and fight against this pandemic. India, as a nation, encouraged its scientific community to develop centres and facilities to study SARS-CoV-2 infections and help in better diagnostics, assay development and also contribute to vaccine research and development. **Translational Health Science and Technology Institute** (**THSTI**), Faridabad played a key role in basic, clinical and translational research.



1. Clinical Research

(i) DBT Consortium

THSTI is the lead coordinator of DBT's Consortium for COVID-19 research, a multi-institutional platform for developing a clinical cohort of patients with COVID-19, collecting bio specimens, and conducting vaccine effectiveness and re-infection studies.

(ii) Establishment of clinical cohorts for COVID-19

These cohorts are being studied for understanding durability of immunity, risk of re-infection, long COVID-19, waning of immunity and break through infection. The following important immunological findings were observed in longitudinal serological studies.

- All with severe disease, 89.6 per cent with mild to moderate infection and 77.3 per cent of asymptomatic participants showed seroconversion (IgG antibodies against RBD antigen).
- Seropositivity decreased by 22 per cent between 6-10 weeks and six months from onset of illness
- Decreasing trend seen across all the three subgroups viz., asymptomatic, mild/moderate and severe.

(*Am J Trop Med Hyg. 2021 May 18; 105(1):66-72. doi: 10.4269/ajtmh.21-0164.*)

(iii) Vaccine effectiveness

- A multi-institutional team of Indian researchers led by THSTI evaluated the real-world vaccine effectiveness of Covishield during the SARS-CoV-2 infection surge between April and May 2021, in India. The vaccine effectiveness against SARS-CoV-2 infection in fully vaccinated individuals was found to be 63 per cent. The vaccine effectiveness of complete vaccination

against moderate-to-severe disease was much higher at 81 per cent. More importantly, the scientists also observed that the spike-specific T-cell responses were conserved against both the delta variant and wild-type SARS-CoV-2.

(*Lancet Infect Dis. 2021 Nov 25:S1473-3099(21)00680-0. doi: 10.1016/S1473-3099(21)00680-0.*)

- In a cross-sectional study, the ability of vaccine (Covishield and Covaxin) and natural infection induced antibodies to neutralise Omicron variant in a live virus neutralisation assay was carried out. Significant reduction in the neutralising ability of both vaccine-induced and vaccine plus infection-induced antibodies was observed for Omicron variant, which might explain immune escape.

(*EBioMedicine. 2022 Mar 15;78:103938. doi: 10.1016/j.ebiom.2022.103938.*)

(iv) Durability of humoral immune response at least six months after complete vaccination with Covishield or Covaxin

In a cross-section observational study conducted between November 2021 and January 2022, it was observed that anti-RBD IgG was persistent in 85 per cent of participants even beyond a median of eight months after complete vaccination. The antibody concentrations were significantly higher in those with hybrid immunity. This implies that humoral immunity may last longer due to heterologous antigenic exposure following vaccination and natural infection emphasising the need for contextualising the booster policy.

(*Pre-print: medRxiv 2022.02.23.22271381; doi: https://doi.org/10.1101/2022.02.23.22271381*)

(v) Longitudinal cohort study to evaluate outcomes of SARS-CoV-2 virus variants

THSTI as the coordinating centre along with a network of hospitals across the country are conducting a study to evaluate the severity and outcomes of SARS-CoV-2 infection and correlation of clinical outcomes with virus variants. The study is ongoing and will help in answering the following questions:

- Is the severity of disease caused by new variants of SARS-CoV-2 different compared to the wild type?
- Is the outcome of COVID-19 due to new variants worse than that due to wild type?
- What are the long-term sequelae of COVID-19?

(vi) Biorepository facility at THSTI

It is a unique resource of well phenotyped COVID-19 cases that followed longitudinally since 2020 and houses more than 5000 corona positive samples. This bioresource has been helping both the academia and industries in the development of diagnostic kits and vaccine development.

2. Vaccine Development

(i) Support to industry

THSTI contributed immensely in the clinical trials/development of vaccines for COVID-19 including Dr Reddy's (Sputnik), ZydusCadilla (ZyCoV-D), and Biological E (Corbevax) and entered into an international collaboration with Nanogen Pharmaceutical Biotechnology JSC, a Vietnamese pharmaceutical company, which is developing a new vaccine for COVID-19.

(ii) Indigenous vaccine work

- THSTI in collaboration with Panacea Biotec has received CEPI funding for a project 'to develop a multi-epitope, nanoparticle-based broadly protective Beta coronavirus candidate vaccine.'

- Researchers at THSTI are working towards developing mRNA and subunit vaccines for COVID-19, which have shown promising results.

3. Diagnostics

(i) In-house diagnostics

For newer in-house diagnostics against SARS-CoV-2 amidst global shortage, THSTI developed technologies, which were transferred to industries as given in Table 1. THSTI developed an antibody ELISA technology, which has been transferred to industry and used for serosurveillance in Karnataka. THSTI also developed the first APTAMER-based SARS-COV-2 detection assay targeting Spike and Nucleocapsid antigens that has also been transferred to industry.

S. No.	Technology	Licensee
1.	ELISA (using receptor binding domain of spike protein) to detect IgG antibodies against SARS-CoV-2	Xcyton Diagnostics Limited
2.	Conventional PCR compatible-DNAzyme-based visual detection method for SARS-CoV-2 as an alternative to real-time PCR-based assay	Genei Labs
3.	Panel of aptamers specific to SARS-CoV-2 spike protein	Molbio Diagnostics
4.	Panel of aptamers specific to SARS-CoV-2 nucleocapsid protein	Cambrain Bioworks LLP

Technologies developed by THSTI w.r.t. SARS-CoV-2 and transferred to industries

Antibody ELISA kit transferred to Xcyton Diagnostics Limited

(ii) RT-PCR Tests

Bioassay Laboratory (BL) has tested more than 1,72,000 clinical samples for SARS-CoV-2 using RT-PCR. Out of these samples, more than 33,000 samples were tested by India's first mobile infectious disease diagnostic lab (I-lab) managed by THSTI.

(iii) Kit Validations and Training

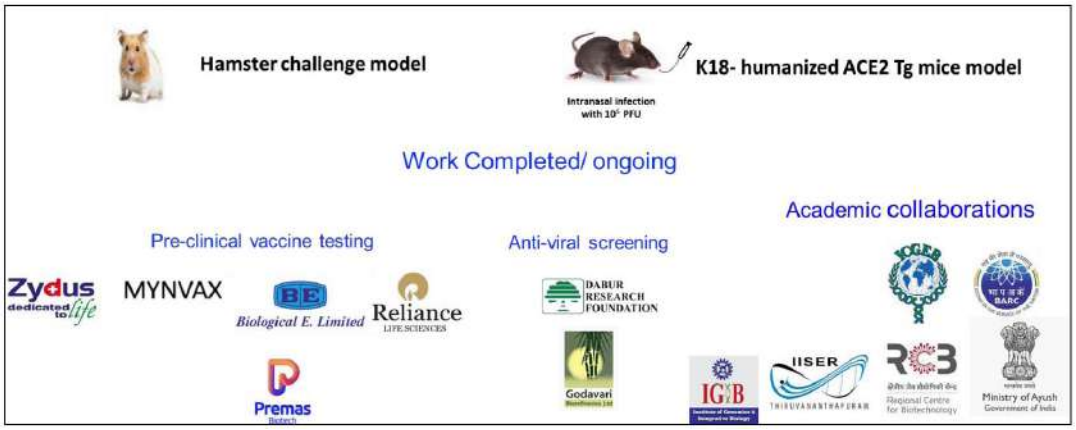
BL has performed 28 COVID-19 kit validations to date. In collaboration with Foundation for Innovative New Diagnostics (FIND), BL trained manpower for COVID-19 from various organisations for capacity building.

(iv) Genome sequencing

THSTI is a member of INSACOG and has sequenced 385 whole genome of SARS-CoV-2 isolated from COVID-19 patients living in Haryana and other states of India. The sequences are deposited in the IHIP portal, INSACOG database and GISAID database.

4. Animal Models

THSTI was the first institution in the country to establish two models of SARS-CoV-2 infections in hamster and ACE2 transgenic mice models. These models were provided to industries (Dr Reddy's, ZydusCadilla, Biological E, etc.) and academia (Ministry of Ayush, IGIB, ICGEB, RCB, etc.) for pre-clinical vaccine testing and anti-viral screening.



Animal models provided to companies and academia for vaccine development

5. Establishment of Assays for Immune Correlates of Protection

(i) The immunology core lab of THSTI provided cellular assay platform for determining the immunogenicity of COVID-19 vaccines. It provides the following T cell assays:

- SARS-CoV-2 specific T cell proliferation
- SARS-CoV-2 specific T cell cytokine production by ELISA, ELISPOT/FLUROSPOT and intracellular staining
- SARS-CoV-2 specific antigen induced marker (AIM) assay

(ii) Live virus neutralisation assays are essential to test efficacy of vaccine and therapeutic molecules. The infectious disease research facility of THSTI carried out neutralisation assays for many vaccine developers and vaccine effectiveness studies.

(iii) BL became a part of Coalition of Epidemic Preparedness Innovations (CEPI) centralised network labs for COVID-19 vaccine testing, the only lab in India with such distinction. The laboratory has developed in-house assays for SARS-CoV-2 by using WHO reference standard for validation.

6. Therapeutic monoclonal antibodies

THSTI has developed potential therapeutic monoclonal antibodies against COVID-19, which have immense therapeutic potential to neutralise the current circulating variant of concerns.

Extensive work done by THSTI on SARS-CoV-2 has helped in the approval of vaccines and diagnostic tests in the country. The in-house strong product pipeline on candidate vaccines, therapeutic antibodies and high sensitivity diagnostic assays are on the horizon to meet the challenge. The work done on understanding the immune response against SARS-CoV-2 after natural infection and vaccination should help in preparing appropriate national policy on vaccination.

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Dr. Soma Patnaik, soma@thsti.res.in

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EFFORTS IMPACTING COVID MITIGATION

The efforts made by various agencies, apex bodies, domain institutions, and so on, which are working in the STI ecosystem towards meeting the requirements posed due to the pandemic are compiled here for the consumption and benefit of the general public. These efforts are presented here in terms of deliverables, outputs, technologies, products, services, etc., which are impactful and bring in STI elements in the activities and initiatives.

SECTION GUIDELINES

CORBEVAX receives DCGI approval for emergency use authorisation for 12-18 year age group

Government invites applications for joint collaboration for development of vaccine against the omicron variant of COVID-19

MoHFW releases India's vaccine development story against COVID-19, in collaboration with Institute for Competitiveness

Institute for Competitiveness, in collaboration with MoHFW, released report on COVID-19: Vaccine Administration Journey

ICMR invites Expression of Interest (EoI) for validation of rapid antigen detection assays for COVID-19

CORBEVAX™ receives DCGI approval for emergency use authorisation for 12-18 year age group

India's first indigenously developed Receptor Binding Domain (RBD) protein sub-unit vaccine for COVID-19, CORBEVAX™, developed by Biological E Limited, has received approval for emergency use authorisation from the Drug Controller General of India (DCGI) for 12-18 year age group. It is approved to be administered in humans including children and adults 12 years and above.

The Department of Biotechnology (DBT) and its Public Sector Undertaking (PSU), Biotechnology Industry Research Assistance Council (BIRAC), have supported Biological E's COVID-19 vaccine candidate from pre-clinical stage through Phase III clinical studies. The vaccine candidate was provided financial support under COVID-19 Research Consortium, through the National Biopharma Mission, for pre-clinical studies and phase I/II clinical trials. Additional support was provided through Mission COVID Suraksha for further clinical development. CORBEVAX™ is a two-dose vaccine administered intramuscularly and can be stored at 2°C to 8°C.

The recombinant protein sub-unit vaccine developed from the RBD of the spike protein on the viral surface is adjuvanted with CpG 1018 and alum. The DCGI has already approved CORBEVAX™, for restricted use in emergency situation among adults on 28 December 2021. Based on interim results of the ongoing phase II/III clinical study, Biological E has received approval for restricted use in an emergency situation in adolescents of 12 to 18 year age group. The available safety and immunogenicity results of the ongoing phase II/III clinical study indicated that the vaccine is safe and immunogenic. The Translational Health Science and Technology Institute (THSTI), an Autonomous Institute of DBT, provided immunogenicity data for the phase II/ III studies.

Website link:

https://pib.gov.in/PressReleasePage.aspx?PRID=1800918

Government invites applications for joint collaboration for development of vaccine against the omicron variant of COVID-19

Indian Council of Medical Research (ICMR) invites Expressions of Interest (EOI) from experienced vaccine manufacturer/ pharma companies/ R&D Institutions, etc. for undertaking R&D activities using SARS-CoV-2 Omicron variant for development of vaccine against COVID-19 and its manufacturing/commercialisation, etc. The objective of this EOI is to make resources available for undertaking R&D as well as manufacturing activities for SARS-CoV-2 Omicron variant by using characterised variants for the development of vaccine against COVID-19. The EOI document contains the details of qualification criteria, submission details,

and evaluation criteria, etc. Considering the prevalent COVID-19 pandemic situation, the EOI may be submitted through e-mail.

Deadline: 4th April 2022

Contact info:

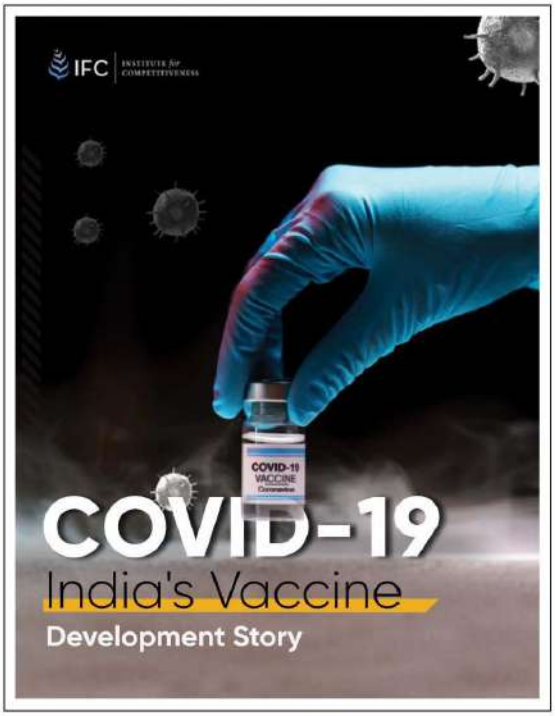
jitendra.narayan@gov.in

Website link:

https://www.icmr.gov.in/pdf/tender/EoI_COVID19_Omicron_Strain.pdf

MoHFW releases India's vaccine development story against COVID-19, in collaboration with Institute for Competitiveness

A report titled 'COVID-19 India's Vaccine Development Story' was published by the Institute for Competitiveness in collaboration with the Ministry of Health and Family Welfare (MoHFW), Government of India. The report documents India's vaccination programme that captures the process, beginning from the initial stages of developing vaccines, the role of each stakeholder, including engaging the state governments and departments, the hurdles faced in the journey, and measures taken to tackle those hurdles and get prepared for the rollout. The report highlights the developmental story of the Government of India, which chalked out the detailed plan to combat the pandemic involving deep scrutiny of the possible ifs and buts that would arise in the execution of the project and how to overcome those. The report was prepared on the request of Ministry of Health and Family Welfare.



Contact info:

info@competitiveness.in

Website link:

https://competitiveness.in/covid-19-indias-vaccine-development-story/

Institute for Competitiveness, in collaboration with MoHFW, released report on COVID-19: Vaccine Administration Journey

A report titled 'India's COVID-19 Vaccination Administration Journey' was published by the Institute for Competitiveness in collaboration with MoHFW. The report highlights the crucial aspect influencing the success of India's COVID-19 vaccine distribution project that included the creation and subsequent implementation of procedures and processes responsible for the safe administration of vaccinations. The document highlights significant challenges faced by the Indian government, like delivering and administering vaccines to over 1.3 billion people of India, ensuring free and equitable distribution, and the prevalence of vaccine eagerness coupled with pockets of vaccine hesitancy. The immense size and heterogeneity further complicated

the vaccine delivery in the whole country. The government chose to carry out the vaccination programme in stages, with recipients sorted into priority sectors for hassle-free immunisation.

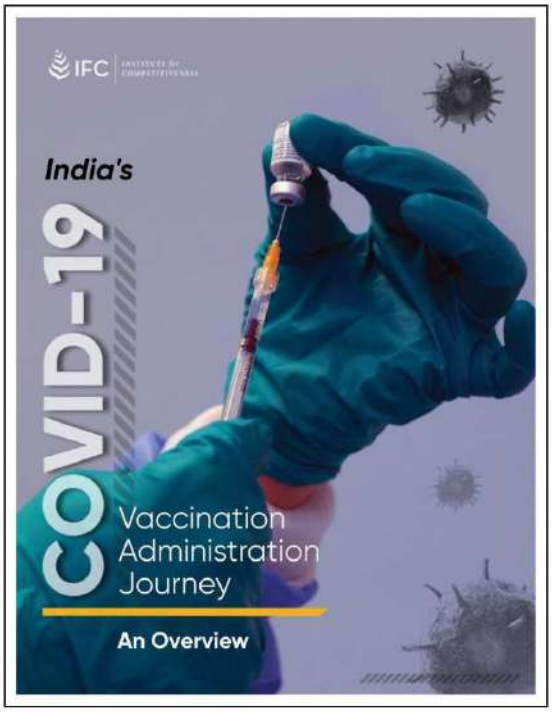
Institute for Competitiveness is the Indian knot in the global network of the Institute for Strategy and Competitiveness at Harvard Business School. Institute for Competitiveness is an international initiative based in India, dedicated to enlarging and purposeful disseminating of the body of research and knowledge on competition and strategy.

Contact info:

info@competitiveness.in

Website link:

https://competitiveness.in/covid-19-vaccine-administration-journey/



ICMR invites Expression of Interest (EoI) for validation of rapid antigen detection assays for COVID-19

ICMR invites applications for validation of rapid antigen detection tests for COVID-19 from all manufacturers who have developed Rapid Antigen Test (RAT) kits. Requirements for validations are based on various categories, like first-time validation, revalidation, and validation with alternate sample types. The gold standard RT-PCR diagnostic test for COVID-19 has limitations in terms of widespread availability. In view of this, there is urgent requirement for reliable and convenient rapid point of care antigen detection assays with high sensitivity and specificity. Such assays could be used as potential diagnostic tests in all possible public and private health care settings and made available for mass testing.

Deadline: Open till next announcement

Contact info:

guptanivedita.hq@icmr.gov.in, drneetu.vijay@icmr.gov.in

Website link:

https://www.icmr.gov.in/pdf/tender/Revised_EOI_for_Ag_kit_validation_13082021.pdf

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3

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 to humankind. 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.

SECTION GUIDELINES

IIT Bombay proposes a novel technique to enhance the efficiency of face shields

Genome sequencing efforts for COVID-19 by IISER Pune

Designing AbhiSCoVac – a single potential vaccine for all corona culprits through immuno-informatics and immune simulation approaches

First indigenous COVID drug – Vincov-19 – to be made available soon

38 organisations participate in genome sequencing of SARS-CoV-2

IIT Bombay proposes a novel technique to enhance the efficiency of face shields

A team of researchers from the Department of Mechanical Engineering from the Indian Institute of Technology Bombay (IIT Bombay), Mumbai, have proposed a novel technique to enhance the efficiency of face shields by coating them with a hydrophobic (water repellent) layer. The resulting composite face shield acts as a barrier for airborne droplets and repels them. This reduces the risk of fomite formation from the surface of the face shield. Expelled droplets are tiny – about 50-200 microns in size (a micron is one-thousandth of a millimetre), and hence, unseen to the naked eye. The team wanted to make protective gear better to help arrest the spread of COVID-19.

When a water droplet falls on a surface, the impacting droplet's energy (kinetic energy) and surface tension (resistive forces) tend to flatten the droplet on the surface before it rebounds. If the surface has a high affinity to attract water (high wettability), such as the PET surface of face shields, the droplet spreads out and sticks to the surface. When the surface is inclined (as when a wearer puts on a face shield), gravity acts on the spreading droplet, making it trickle down. The 'runny' droplet impacts the visibility of the face shield and increases the chances of fomite formation.

Contact info:

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Website link:

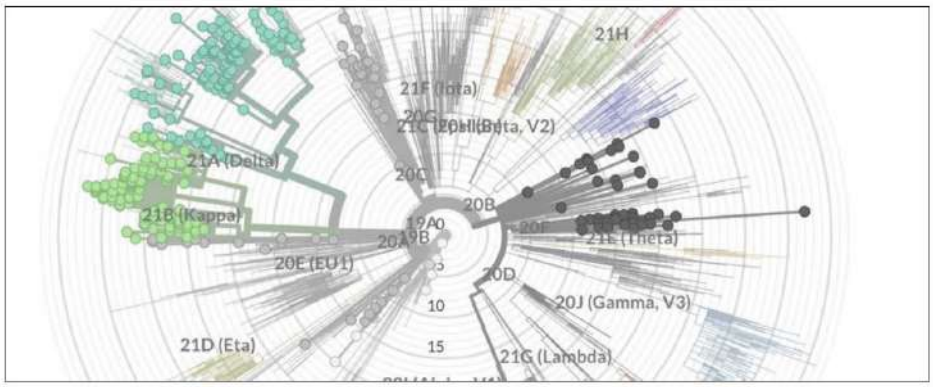
https://www.iitb.ac.in/en/research-highlight/better-face-shields-better-protection-hydrophobic-coating-helps-mitigate-covid-19

Genome sequencing efforts for COVID-19 by IISER Pune

Variants of the SARS-CoV-2 virus pose a major challenge as some of these may have altered virulence, transmissibility, the potential to cause re-infections, and even breakthrough infections in the fully vaccinated. It is essential in this scenario to identify virus variants rapidly, at scale, along with associated epidemiological and clinical data.

The COVID-19 genome sequencing work at IISER Pune is being carried out through two channels of collaboration: as a member of INSACOG and as a member of a consortium led by CSIR-CCMB. The SARS-CoV-2 genome sequencing effort at IISER Pune is currently supported by the Rockefeller Foundation, the Villoo Poonawalla Foundation (VPF) and the Jankidevi Bajaj Gram Vikas Sanstha (JBGVS).

This work is carried out at IISER Pune campus in an independent COVID-19 genome sequencing initiative at the National Facility for Gene Function in Health and Disease (NFGFHD) building. Here, dedicated and well-equipped facilities for RNA handling, cDNA and library preparation, and next-generation sequencing enable the sequencing effort and data is uploaded to Government-approved online portals. The facility is run by a dedicated team of eight members.



Representative map of genomic variants

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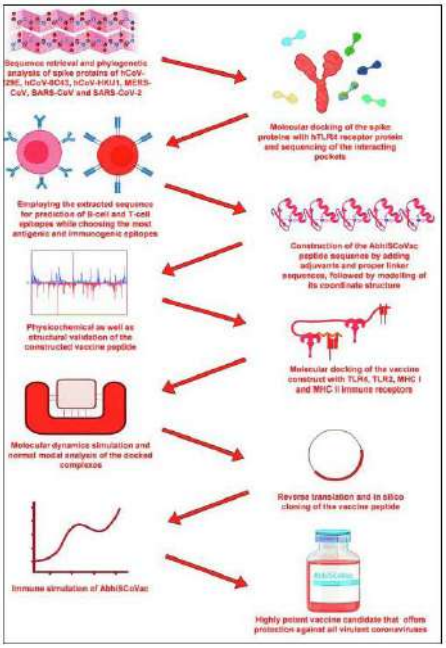
Website link:

https://www.iiserpune.ac.in/news/post/covid-19-genome-sequencing-efforts-at-iiser-pune/273

Designing AbhiSCoVac – a single potential vaccine for all corona culprits through immuno-informatics and immune simulation approaches

The coronaviridae family has generated highly virulent viruses, including the ones responsible for three major pandemics in the last two decades with SARS in 2002, MERS outbreak in 2012 and the current nCOVID19 crisis that has turned the world breathless. Future outbreaks are also a plausible threat to mankind. The spike proteins present in all these viruses function as credible PAMPs that are majorly sensed by human TLR4 receptors. IISER, Berhampur, Odisha study aims to recognise the amino acid sequence(s) of the viral spike proteins that are precisely responsible for interaction with human TLR4 and to screen the immunogenic epitopes present in them to develop a multi-epitope multi-target chimeric vaccine against the coronaviruses. Molecular design of the constructed vaccine peptide is qualified in silico; additionally, molecular docking and molecular dynamics simulation studies collectively reveal strong and stable interactions of the vaccine construct with TLRs and MHC receptors. In silico cloning is performed for



Process flow in designing of AbhiSCoVac

proficient expression in bacterial systems. In silico immune simulation of the vaccine indicates highly immunogenic nature of the vaccine construct without any allergic response. The present bio computational study hereby innovates a vaccine candidate – AbhiSCoVac, hypothesised as a potent remedy to combat all the virulent forms of coronaviruses.

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Website link:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8801591/pdf/main.pdf

First indigenous COVID drug – Vincov-19 – to be made available soon

The first indigenous drug to treat COVID-19 is likely to be made available to the public soon with the completion of clinical trials, which showed 'excellent results', informed Tata Institute for Genetics and Society (TIGS) Director Rakesh Mishra. The product, Vincov-19, is a collaborative effort of CSIR-Centre for Cellular & Molecular Biology (CCMB), University of Hyderabad (UoH) and city-based VINS Bioproducts. In this, the SARS-CoV-2 virus is inactivated and injected into horses. The antibodies generated through the blood serum is synthesised and purified to be turned into a drug, which would then be injected into humans for neutralising the COVID-19 virus.

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Website link:

https://www.csir.res.in/sites/default/files/11%20To%2015%20March%20%202022.pdf

38 organisations participate in genome sequencing of SARS-CoV-2

The Indian SARS-CoV-2 Genomics Consortium (INSACOG), jointly initiated by the Union Ministry of Health and Department of Biotechnology (DBT) with Council for Scientific & Industrial Research (CSIR) and Indian Council of Medical Research (ICMR), is a consortium of 38 laboratories to monitor the genomic variations in the SARS-CoV-2.

INSACOG is a multi-laboratory, multi-agency, pan-India network to monitor genomic variations in SARS-CoV-2 by a sentinel sequencing effort, which is facilitated by the National Centre for Disease Control (NCDC), Delhi involving the Central Surveillance Unit (CSU) under the Integrated Disease Surveillance Programme (IDSP).

The consortium is actively working towards establishing a systematic correlation between genome sequencing and clinical outcomes. The consortium in its attempt to answer questions related to host immune response, long term effects in immunity of COVID-19 infected individuals, is working towards establishing a hospital network across the country.

List of participating organisations:

1. National Institute of Biomedical Genomics (NIBMG), Kalyani
2. National Centre for Disease Control (NCDC), Delhi
3. Institute of Genomics and Integrative Biology (IGIB), Delhi
4. Centre for Cellular & Molecular Biology (CCMB), Hyderabad
5. Institute of Life Sciences (ILS), Bhubaneswar
6. Institute for Stem Cell Science and Regenerative Medicine (inStem) and National Centre for Biological Sciences (NCBS), Bengaluru
7. Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad
8. National Centre for Cell Science (NCCS), Pune
9. National Institute of Virology (NIV), Pune
10. National Institute of Mental Health and Neurosciences (NIMHANS), Bengaluru
11. North East Institute of Science and Technology, Jorhat
12. Indian Institute of Chemical Biology (IICB), Kolkata
13. National Chemical Laboratory (NCL), Pune
14. Byramjee Jeejeebhoy Government Medical College (BJGMC), Pune
15. Central Drug Research Institute (CDRI), Lucknow
16. Indian Institute of Science Education and Research (IISER), Pune
17. National Botanical Research Institute (NBRI), Lucknow
18. Gujarat Biotechnology Research Centre (GBRC), Gandhinagar
19. Institute of Bioresources and Sustainable Development (IBSD), Imphal
20. Institute of Microbial Technology (IMTECH), Chandigarh
21. Institute of Liver and Biliary Sciences (ILBS), New Delhi
22. All India Institute of Medical Sciences (AIIMS), New Delhi
23. Rajiv Gandhi Centre for Biotechnology (RGCB), Thiruvananthapuram
24. Regional Medical Research Center (RMRC), Bhubaneswar
25. National Institute for Research in Tuberculosis (NIRT), Chennai
26. Regional Medical Research Center (RMRC), Dibrugarh
27. Centre for Brain Research (CBR-IISc), Bengaluru
28. Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru
29. Translational Health Science and Technology Institute (THSTI), Faridabad
30. Indira Gandhi Institute of Medical Sciences (IGIMS), Patna
31. Government Doon Medical College (GDMC), Dehradun

32. Mahatma Gandhi Medical College (MGMC), Jaipur
33. All India Institute of Medical Sciences (AIIMS), Bhopal
34. Gandhi Medical College (GMC), Secunderabad
35. Sri Aurobindo Institute of Medical Sciences (SAIMS) & PGI, Indore
36. Government Medical College (GMC), Patiala
37. Kempegowda Institute of Medical Sciences (KIMS), Bengaluru
38. Kasturba Hospital for Infectious Diseases (KHID), Mumbai

Website link:

https://dbtindia.gov.in/insacog

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COVID RESOURCES AND OUTREACH

The efforts made by multiple agencies and institutions in compiling the information, releasing the knowledge products in print or digital form, and reaching out to multiple target audiences are gathered here for one point, ready-to-use evidence. These include resource books, newsletters, magazines, exclusive editions, and so on.

SECTION GUIDELINES

Government felicitates best women COVID-19 vaccinators

Government took numerous proactive measures to alleviate adverse effects of COVID-19 on the tribal communities

India's COVID-19 vaccination coverage crosses 180 crore doses

Ministry of Education releases e-booklet on COVID-19 related R&D work by centrally funded technical institutes

Press Information Bureau releases daily bulletin on COVID-19

Government of India presents a regular COVID-19 India factsheet and immunisation programme

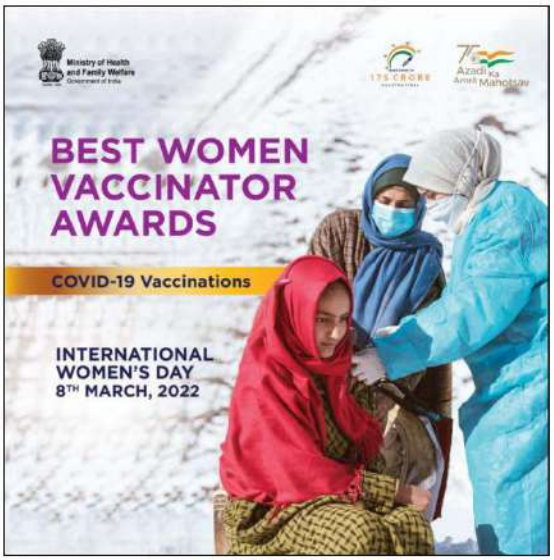
CSIR bulletin on COVID news and updates about the pandemic

Outreach initiatives of COVID-related information repository through India Science, Technology and Innovation (ISTI) Portal

Outreach initiatives by India Science Channel

COVID-19: Science & Technology Efforts in India – An information resource on the pandemic

Government felicitates best women COVID-19 vaccinators



On the occasion of International Women's Day on 8 March 2022, Dr Mansukh Mandaviya, Union Minister of Health and Family Welfare (MoHFW) felicitated 72 Best Women COVID-19 Vaccinators from 36 states and UTs at the National Institute of Health and Family Welfare, New Delhi. The Union Health Minister applauded and saluted the efforts of women soldiers in the holistic development of the health sector.

The event was organised to celebrate and recognise the untiring efforts in successful implementation of India's COVID-19 vaccination programme. The women vaccinators have been the harbingers of change in this whole journey.

The Union Health Minister applauded the efforts of women soldiers in the holistic development of the health sector, and said that the development of the health sector is incomplete without the contribution of women. He also lauded the efforts of ASHA and ANM workers who are the pillars of health sector development. They are reaching the last mile, traversing difficult terrains, going to every house to ensure that every eligible person is vaccinated. Under Har Ghar Dastak Campaign, ASHA workers reached out to every household, promoted the uptake of vaccines and thereby, overcame vaccine hesitancy, subsequently making India a global leader in the COVID-19 vaccination programme.

To view the details of awardees, visit https://drive.google.com/file/d/1GSBTq0vQjkTmxwiPgAcbKUxgjU51aN45/view.

Website link:

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1804013

Government took numerous proactive measures to alleviate adverse effects of COVID-19 on the tribal communities

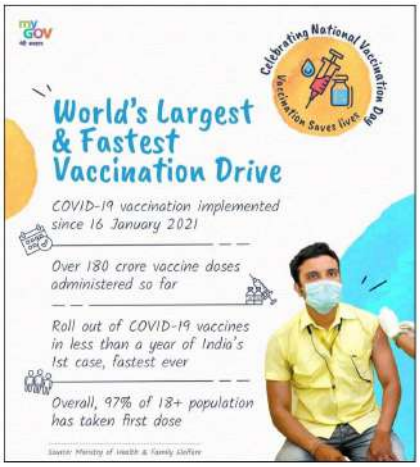
COVID-19 has been treated by the Government as a national calamity and accordingly different measures including vaccination are ensured for all. Ministry of Tribal Affairs (MoTA) has coordinated with the officers in the State Tribal Welfare Department, to assess the preventive and curative needs to curb the spread of COVID-19 among tribal communities and extend a helping hand in meeting the urgent requirement in coordination with the Ministry of Health and Family Welfare.

With the 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 the population. The Ministry of Tribal Affairs has taken up proactive measures to mitigate its adverse effects on the tribal community.

Website link:

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1805917

India's COVID-19 vaccination coverage crosses 180 crore doses

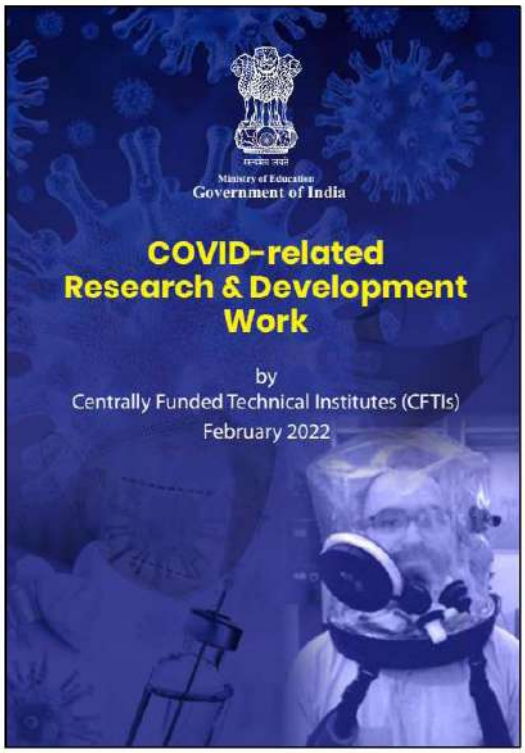


The world's largest vaccination drive is touching new heights. With the administration of more than 20.31 lakh (20,31,275) vaccine doses in the last 24 hours, India's COVID-19 vaccination coverage has exceeded 180.13 crore (1,80,13,23,547) as per provisional reports till 13 March 2022.

Website link:

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1805471

Ministry of Education releases e-booklet on COVID-19 related R&D work by centrally funded technical institutes



The Ministry of Education, Government of India has published an e-booklet on COVID-19 related research and development work done by different centrally funded technical institutes (CFTIs). CFTIs have embarked on cross domain multi-disciplinary research on providing effective solutions to some of the hard hitting problems during the pandemic that triggered a demand for safety products like masks, PPEs, sanitizers, handwash, etc. Besides these common products, the demand of the medical community for major medical devices like RT-PCR testing kits, ventilators, oxygen supplement, beds, mobile units was phenomenal due to the vast spread of the virus across the country.

CFTIs have also continued to pursue in their scientific pursuits by devising new ways of working by devising SOPs for research labs and incubation centres. The industry academia connect has also witnessed greater participation. Some of the successful prototypes have been taken up for commercialisation by industrial establishments and new products have been launched into the market at affordable costs for masses. New startups have also been initiated, which are being supported by investors and industries and it is expected to see more new products being launched in the near future.

A compilation of the efforts of young students from CFTIs in the form of this booklet will help in spreading awareness and share their ideas with industry, academics, institutes and other entrepreneurs across the world.

Website link:

https://owncloud.iitd.ac.in/nextcloud/index.php/s/SwEF7Nfoon4MYMQ

Press Information Bureau releases daily bulletin on COVID-19

Press Information Bureau (PIB), Government of India releases a daily bulletin on COVID-19, starting from the early days of its outbreak. The bulletin contains press releases concerning COVID-19, issued in the last 24 hours, inputs from PIB field offices, and fact checks undertaken by PIB. These bulletins are published in 14 languages: Hindi, English, Urdu, Marathi, Telugu, Tamil, Punjabi, Bangla, Kannada, Oriya, Gujarati, Assamese, Malayalam and Manipuri. The following data points were released on 21 March 2022.

181.24 cr vaccine doses have been administered so far under Nationwide Vaccination Drive
India's Active caseload currently stands at 25,106
Active cases stand at 0.06%
Recovery Rate currently at 98.74%
2,652 recoveries in the last 24 hours increases Total Recoveries to 4,24,67,774
1,549 new cases recorded in the last 24 hours
Daily positivity rate (0.40%)
Weekly Positivity Rate (0.40%)
78.30 cr Total Tests conducted so far; 3,84,499 tests conducted in the last 24 hours

Website link:

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1807898

Government of India presents a regular COVID-19 India factsheet and immunisation programme

Government of India has provided, through the free-of-cost category and direct-state procurement category, more than 181 crore vaccine doses (1,81,24,97,303) to States/UTs.

India's coronavirus cases have crossed four crores, and as of 21 March 2022, 08:00 AM, it stands at 4,30,09,390 cases, of which 4,24,67,774 have recovered. The recovery rate stands at 98.21 per cent while the case fatality rate has been pegged at 1.20 per cent.

Website link:

https://www.mygov.in/covid-19

CSIR bulletin on COVID news and updates about the pandemic

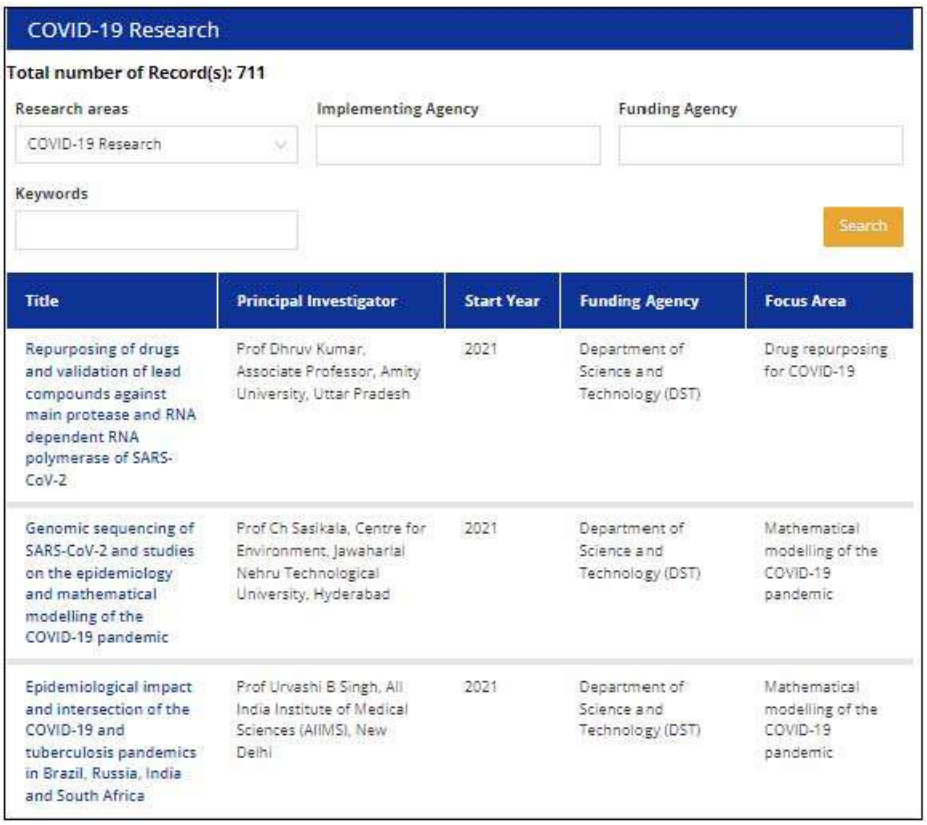
CSIR was at the forefront of the battle against COVID-19 pandemic. It also put in place measures to counter the infodemic. CSIR-In-Media is a weekly newsletter published by CSIR magazine that showcases the institute's significant research contributions.

Website link:

https://www.csir.res.in/news-bulletin

Outreach initiatives of COVID-related information repository through India Science, Technology and Innovation (ISTI) Portal

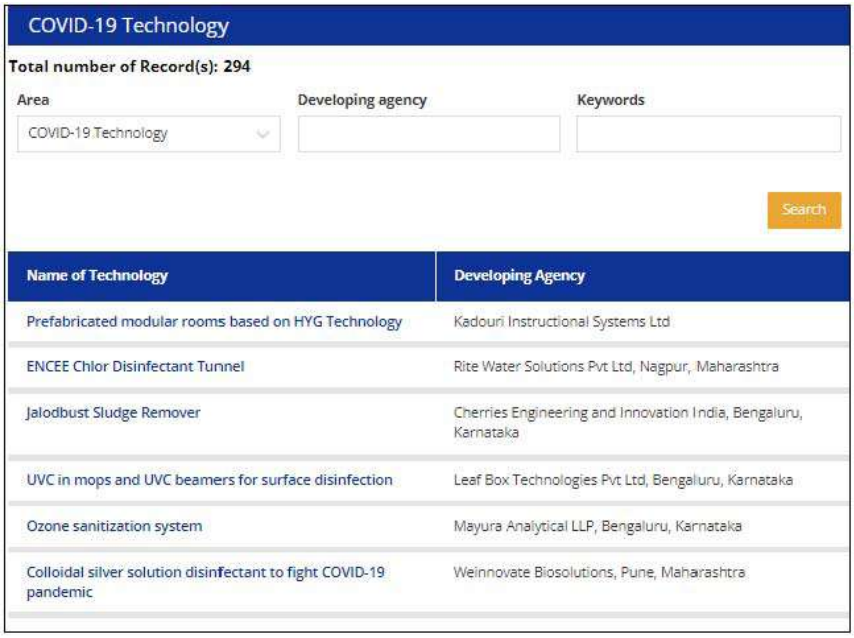
The India Science, Technology and Innovation (ISTI) Portal is a centralised window for information about developments in India on science, technology, and innovation. The vision is to provide a single-window source of information on a web portal about all data related to the Indian STI ecosystem by aggregating data on scientific inputs and outputs, bringing stakeholders together and disseminating science, technology and innovation content. 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; and projecting science in India with its significant achievements. ISTI Portal has been developed by Vigyan Prasar, an autonomous organisation of the DST.



Title	Principal Investigator	Start Year	Funding Agency	Focus Area
Repurposing of drugs and validation of lead compounds against main protease and RNA dependent RNA polymerase of SARS-CoV-2	Prof Dhruv Kumar, Associate Professor, Amity University, Uttar Pradesh	2021	Department of Science and Technology (DST)	Drug repurposing for COVID-19
Genomic sequencing of SARS-CoV-2 and studies on the epidemiology and mathematical modelling of the COVID-19 pandemic	Prof Ch Sasikala, Centre for Environment, Jawaharlal Nehru Technological University, Hyderabad	2021	Department of Science and Technology (DST)	Mathematical modelling of the COVID-19 pandemic
Epidemiological impact and intersection of the COVID-19 and tuberculosis pandemics in Brazil, Russia, India and South Africa	Prof Urvashi B Singh, All India Institute of Medical Sciences (AIIMS), New Delhi	2021	Department of Science and Technology (DST)	Mathematical modelling of the COVID-19 pandemic

In the critical times of the COVID-19 outbreak, 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 the Government of India and a string of institutions spread across the country. The content presented here relies on the best available scientific understanding of the disease and its transmission.

The web portal provides all information related to COVID-19, from presenting symptoms to vaccine science, distribution strategy, and preventive measures initiated for envisaged future waves. It contains content on fact-checks and myth-busters in the question and answer format, contributions from the research fraternity, start-up spotlights, industry collaborations, communications and resources, reaching out to society and so on. A dedicated focus has been given to exhibiting funding opportunities catering to the second wave of the COVID-19 pandemic.



Contact info:

istiportal@vigyanprasar.gov.in

Website link:

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

Outreach initiatives by India Science Channel

India Science is an Internet-based Over-The-Top (OTT) science TV channel. An initiative of the Department of Science and Technology (DST), Government of India, it is 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. COVID-19 Explained: Short films to explain the important research findings related to COVID-19 and COVID-19 vaccination in layman's language are produced on a weekly basis. The topics chosen for COVID-19 Explained cater to the curiosity of the common man towards the pandemic.
2. Facebook live sessions on interviews of various stakeholders on COVID-19 vaccination programme.
3. Facebook and India Science live sessions on interviews with experts on COVID-19 vaccination.
4. 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.
5. India Science started 'Corona Ko Harana Hai' from April 2021. In this programme, India Science team conduct interviews on COVID-19-related different issues with top medical professionals of the country.
6. India Science makes infographics on COVID-19-related different issues regularly.
7. COVID-19 vaccine: Fact File also telecast every Saturday from India Science.
8. Produced COVID-19 related videos in Self Reliant series.
9. Special interview telecast with Secretary, DBT on COVID-19 related work done by DBT.

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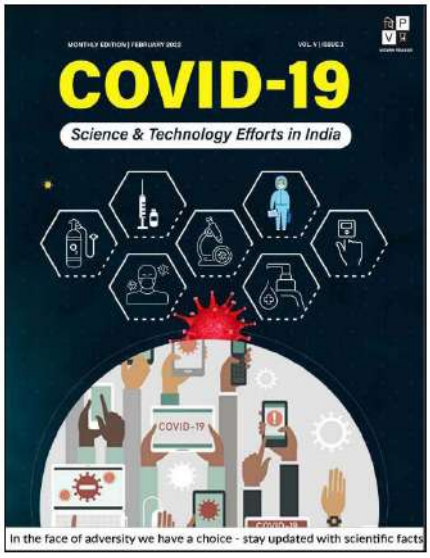
Website link:

https://www.indiascience.in/

COVID-19: Science & Technology Efforts in India – An information resource on the pandemic

Effective communication is in its own right a non-pharmaceutical intervention for any epidemic that can increase adherence to protective behaviours necessary to mitigate its spread. There is no 'best practice' for communication during a complex public health emergency, but past experiences have led to several principles that contribute to a successful strategy. India is

fighting the second wave of the COVID pandemic with a lot of resilience and grit. A very encouraging and precise trend is now visible as the positivity rate is declining rapidly. In 2020, India dealt with the first wave of the COVID-19 pandemic with collective measures, scientific approaches, and awareness. 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 newsletter – COVID-19: Science & Technology Efforts in India – is being compiled to inform our readers and strengthen the usefulness of any published information.



To bridge the gap between scientific contributions, leadership and administrative efforts, and the general public's perspective, Vigyan Prasar is continuously reaching out to its audiences by way 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 with the much-needed assurance that this may be the outcome of improving the health infrastructure and making health the cornerstone at the policy level. The e-Newsletter aims to be a handy guide to scientists, researchers, and scholars, especially those interested.

The latest edition was digitally published in February 2022.

Contact info:

covidnewsletter@vigyanprasar.gov.in

Website link:

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

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5

COVID FACT-CHECKS

This section attempts to answer frequently asked questions (FAQs) on various aspects of the COVID-19 disease, variants and mutants, associated illnesses and diseases, riding the second wave, assumptions on future waves, and, subsequently, busting the myths spread in the society.

SECTION GUIDELINES

1. COVID-19 & Cancer
2. COVID-19: OMICRON Variant
3. SARS-CoV-2 surveillance in India
4. COVID-19: Delta and Delta Plus variants
5. COVID-19 vaccination for pregnant women
6. COVID-19 & Children
7. COVID-19 and White Fungus infection
8. COVID-19 & Use of oxygen
9. COVID-19 & Therapeutics
10. COVID-19 & Black Fungus Disease
11. COVID-19 & Indoor Air

1. COVID-19 & Cancer

Q. Should patients with cancer receive the COVID-19 vaccine?

A. The data on efficacy and safety of COVID-19 vaccination in patients with cancer is limited. However, as patients with cancer are more prone to contract a severe form of illness due to COVID-19 infection, the benefits of getting vaccinated are more than the risks.

Q. Should people who have completed their treatment for cancer receive the COVID-19 vaccine?

A. Patients who have completed their treatment for cancer should receive the COVID-19 vaccine as soon as it is available to them as long as there are no major allergies.

Q. What does it mean to be immune-compromised?

A. 'Immune compromised' refers to individuals whose immune system is considered weaker, more impaired, or less robust than that of the average healthy adult. The primary role of the immune system is to help fight off infection. Individuals with compromised immune systems are at a higher risk of getting infections, including viral infections such as COVID-19. There are many reasons that a person might be immune-compromised. Health conditions such as cancer, diabetes, or heart disease, older age, or lifestyle choices such as smoking can all contribute to weakened immune systems.

Q. Does receiving chemotherapy or radiation raise your risk of getting COVID-19 or having a more serious course of illness?

A. To date, limited evidence is available to suggest that any cancer treatment raises your risk for getting COVID-19 any more or less than anyone else who is exposed to the virus. There is some evidence that patients with cancer may experience more serious COVID-19 infection if they acquire it, more so because cancer and cancer treatment can contribute to weakened immune systems, which can then lead to a reduced ability to fight off infections. It is not clear at this point if cancer patients who have received chemotherapy or radiation in the past are at increased risk for COVID-19. The risk of infection may depend, in part, on the specific treatment received, the type of cancer treated, and how much time has passed since the treatment was completed.

Q. Should people who are on cancer-directed therapy receive the COVID-19 vaccine?

A. Patients who are on cancer-directed therapy can receive the vaccine after discussing it with their treating oncologist. The oncologist will suggest a suitable time based on the ongoing therapy (surgery, radiation, chemotherapy, immunotherapy, or stem cell transplant). Please inform the treating oncologist if you have had any drug allergies in the past.

Q. Which COVID-19 vaccine is the best for patients with cancer?

A. All the approved vaccines have been shown to be effective. There are no direct comparisons between the available vaccines for efficacy or safety. Therefore, it is suggested that you take any vaccine approved for use and available in your vaccination centre.

Q. Is there any contraindication for the COVID-19 vaccine in patients with cancer?

A. Patients who are allergic to polyethylene glycol (PEG) should not receive the COVID-19 vaccine. Individuals with a known history of polysorbate-80 allergy (used as excipient in certain chemotherapeutic drugs) should not receive COVID-19 vaccine.

Q. Should patients with a previous history of COVID-19 infection be vaccinated?

A. Yes, cancer patients who had been infected and recovered from the illness should also receive the COVID-19 vaccine as it will protect from re-infection.

Q. Should the vaccine be given to patients with positive COVID-19 antibodies?

A. The COVID-19 vaccine should be given to all patients with cancer irrespective of their antibody status. Serological testing should not be used to guide the decision and timing of vaccination.

Q. What are the side effects that may occur after the COVID-19 vaccine?

A. You may expect some minor side effects like soreness of the shoulder (injection site) for a few days after the vaccination. Also, you may have mild fever, tiredness for a day or two after the injection. Serious side effects are extremely rare, but we advise you to consult your doctor in case of any troublesome symptoms.

2. COVID-19: OMICRON Variant

Q. What is Omicron and why is it a Variant of Concern (VoC)?

A. This new variant of SARS-CoV-2, named B.1.1.529 or Omicron (based on Greek alphabets such as alpha, beta, delta, etc.) has recently been reported in South Africa. There are a large number of mutations in this variant, especially more than 30 in the viral spike protein, which is the major target for immune responses. The World Health Organization has declared Omicron as a Variant of Concern (VoC) because of the combination of mutations that previously individually have been associated with increased infectivity or immune evasion, and the sudden rise in number of positive cases in South Africa.

Q. Why is it called Omicron?

A. The WHO named the B.1.1.529 variant Omicron in the tradition of giving variants a Greek letter name.

Q. How easily does Omicron spread?

A. The Omicron variant is more likely to spread than the original SARS-CoV-2 virus. How quickly Omicron spreads, compared to Delta, is unknown. The CDC expects that anyone infected with

Omicron will be able to spread the virus to others, even if they have been vaccinated or do not have symptoms.

Q. Can the currently used diagnostics methods, detect Omicron?

A. The RT-PCR method is the most widely accepted and used diagnostic method for SARS-CoV-2 variant. To confirm the presence of the virus, this method detects specific genes in the virus, such as Spike (S), Enveloped (E), and Nucleocapsid (N), among others. However, because the S gene in Omicron is heavily mutated, some of the primers may produce results indicating the absence of the S gene (called S gene drop out). This specific S gene dropout, along with the detection of other viral genes, could be used as an Omicron diagnostic feature. However, genomic sequencing is required for the final confirmation of the Omicron variant.

Q. Should we be concerned about the new VoC?

A. It is important to note that Omicron has been declared as a VoC based on the observed mutations, their predicted characteristics of increased transmission and immune evasion, and preliminary evidence of a negative change in COVID-19 epidemiology, such as increased re-infections. The definitive proof of increased remission and immune evasion is still awaited.

Q. Will Omicron cause more severe illness?

A. More research is needed to determine whether Omicron infections, particularly re-infections and breakthrough infections in fully vaccinated people, cause more severe illness or death than infection with other variants.

Q. What precautions should we take?

A. Individuals can reduce the spread of the COVID-19 virus by keeping a physical distance of at least 1 metre from others, wearing a well-fitting mask, opening windows to improve ventilation, avoiding poorly ventilated or crowded spaces, keeping hands clean, coughing or sneezing into a bent elbow or tissue, and getting vaccinated when their turn comes.

Q. Will there be a third wave?

A. Cases of Omicron are increasingly being reported from countries outside of South Africa, and given its characteristics, it is likely to spread to more countries, including India. However, the magnitude and extent of the increase in cases and, more importantly, the severity of the disease that will be caused, are still unclear. In addition, given the rapid pace of vaccination in India and the high exposure to the delta variant as evidenced by the high seropositivity, the severity of the disease is expected to be low. However, the scientific evidence is still evolving.

Q. Will the existing vaccines be effective against Omicron?

A. Although there is no evidence to suggest that existing vaccines do not work on Omicron, some of the mutations reported in the Spike gene may reduce the effectiveness of existing vaccines. However, vaccine protection also involves antibodies and cellular immunity, which should be relatively better preserved. Therefore, vaccines are always expected to provide protection against serious disease, and vaccination with available vaccines is crucial. If you are eligible, but not vaccinated, you must be vaccinated.

Q. Why do variants occur?

A. Variants are an integral part of evolution and as long as the virus is able to infect, replicate, and transmit, they will continue to evolve. Also, not all variants are dangerous and most of the time we don't notice them. It is only when they are more contagious, or can re-infect people, etc., that they gain importance. The most important step in avoiding the generation of variants is to reduce the number of infections.

Q. Is the Omicron transmission capacity higher than that for the COVID-19 Delta variant?

A. The Omicron version has raised alarm amongst epidemiologists who're involved that the mutations within the new version ought to make it greater transmissible than the preceding variants. Further researches are being conducted to decide whether or not the Omicron version is greater transmissible than different variants, which includes the Delta version. The variety of checks for COVID-19 has been regularly growing across the world. Another extreme subject is that the Omicron version has already been detected in numerous countries, which includes Japan, Belgium, Botswana, Hong Kong, Australia, the Netherlands, South Africa, and Israel.

In addition to increasing the variety of COVID-19 checks, epigenetic researchers are urgently trying to make clear any hard elements related to the COVID-19 Omicron version. It is uncertain whether or not the Omicron version will increase COVID-19 severity. However initial researches have pronounced that the Omicron version elevated hospitalisation for COVID-19 sufferers in South Africa, which may be associated with COVID-19 complications. In addition, it remains uncertain as to whether or not the Omicron version might also additionally sell different variants, which includes the Delta version, thereby suggesting that in addition research might be wanted for complete clarification.

Q. Is there any impact of the Omicron variant on the COVID-19 severity in cancer patients?

A. Previous studies have stated that the Delta variant or other variants can sometimes increase the severity of COVID-19 in cancer patients. COVID-19 has been reported to promote cell senescence and oxidative stress, which is linked to complications of COVID-19 in cancer patients. Additionally, various studies have reported that COVID-19 can cause increased cytokine secretion, which is linked to the aggressiveness of COVID-19. However, more studies are needed to better understand the impact of the Omicron variant in cancer patients.

Q. Is the Omicron variant having an effect on monoclonal antibody treatments?

A. There is currently no virus-specific data available to determine whether monoclonal antibody treatments will continue to be effective against the Omicron variant. Based on data from other variants with significantly fewer changes in the RBD, the Omicron variant is expected to remain susceptible to some monoclonal antibody treatments, while others may be less effective.

Q. How is India responding?

A. The Indian government is monitoring the situation closely and issuing appropriate guidelines from time to time. Meanwhile, the scientific and medical community is prepared for the development and implementation of diagnostics, genomic surveillance, generation of evidence on viral and epidemiological characteristics, and development of therapies.

3. SARS-CoV-2 surveillance in India

Q. What is INSACOG?

A. The Indian SARS-CoV-2 Genomics Consortium (INSACOG) is a national multi-agency consortium of Regional Genome Sequencing Laboratories (RGSLs) established by the Government of India on 30th December 2020. Initially, this consortium had 10 laboratories. Subsequently, the scope of laboratories under INSACOG was expanded and at present there are 28 laboratories under this consortium, which monitor the genomic variations in SARS-CoV-2.

Q. What is the objective of INSACOG?

A. The SARS-CoV-2 virus, commonly known as COVID-19 virus, posed unprecedented public health challenges globally. To fully understand the spread and evolution of this virus, its mutations and resulting variants, the need for in-depth sequencing and analysis of the genomic data was felt. Against this backdrop, INSACOG was established to expand whole genome sequencing of SARS-CoV-2 virus across the nation, aiding understanding of how the virus spreads and evolves. Any changes to the genetic code, or mutations in the virus, can be observed based on the analysis and sequencing of samples done in the laboratories under INSACOG. INSACOG has the following specific objectives:

- To ascertain the status of variants of interest (VoI) and variants of concern (VoC) in the country
- To establish sentinel surveillance and surge surveillance mechanisms for early detection of genomic variants and assist in formulating effective public health response
- To determine the presence of genomic variants in samples collected during super-spreader events and in areas reporting increasing trend of cases/deaths, etc.

Q. When did India start SARS-CoV-2 viral sequencing?

A. India started sequencing SARS-CoV-2 viral sequencing of genomes in 2020. Initially, National Institute of Virology (NIV) and Indian Councilof Medical Research (ICMR) sequenced samples of international passengers who arrived in India from the UK, Brazil or South Africa or transited through these countries, which reported a sudden surge in cases. RTPCR positive samples from states reporting sudden surges in cases were sequenced on priority. This was further expanded through the efforts of Council of Scientific and Industrial Research (CSIR), Department of Biotechnology (DBT) and National Centre for Disease Control (NCDC), as well as individual institutions.

The initial focus of India was on restricting the spread of global variants of concern in the country – Alpha (B.1.1.7), Beta (B.1.351) and Gamma (P.1) – which had high transmissibility. The entry of these variants was carefully tracked by INSACOG. Subsequently, the Delta and Delta Plus variants were also identified based on whole genome sequencing analysis conducted in the INSACOG laboratories.

Q. What is the strategy for SARS-CoV-2 surveillance in India?

A. Initially, genomic surveillance was focused on the variants carried by international travellers and their contacts in the community through sequencing three to five per cent of the total RTPCR positive samples.

Subsequently, the sentinel surveillance strategy was also communicated to the States/UTs in April 2021. Under this strategy, multiple sentinel sites are identified to adequately represent the

geographic spread of a region, and RT-PCR positive samples are sent from each sentinel site for whole genome sequencing. Detailed Standard Operating Procedures (SOPs) for sending samples from the identified sentinel sites regularly to the designated RGSLs were shared with States/UTs. The list of INSACOG RGSLs tagged to States was also communicated to the States. A dedicated nodal officer was also designated by all States/UTs for coordinating the activity of whole genome sequencing.

1. Sentinel Surveillance (for all States/UTs/): This is an ongoing surveillance activity across India. Each State/UT has identified sentinel sites (including RT-PCR labs and tertiary health care facilities) from where RT-PCR positive samples are sent for whole genome sequencing.
2. Surge Surveillance (for districts with COVID-19 clusters or those reporting a surge in cases): A representative number of samples (as per the sampling strategy finalised by a state surveillance officer/central surveillance unit) are collected from the districts, which show a surge in the number of cases and are sent to RGSLs.

Q. What is the standard operating procedure (SOP) for sending samples to INSACOG laboratories?

A. The SOPs for sending samples to INSACOG laboratories and subsequent action based on genome sequencing analysis are as follows:

1. The Integrated Disease Surveillance Project (IDSP) machinery coordinates sample collection and transportation from the districts/sentinel sites to RGSLs. The RGSLs are responsible for genome sequencing and identification of VoCs/VoIs, potential VoIs, and other mutations. Information on VOCs/ VOIs is submitted to the Central Surveillance Unit, IDSP, to establish clinico-epidemiological correlation in coordination with state surveillance officers.
2. Based on discussions in the Scientific and Clinical Advisory Group (SCAG) established to support the INSACOG, it was decided that upon identification of a genomic mutation, which could be of public health relevance, RGSL will submit the same to SCAG. SCAG discusses the potential VoIs and other mutations and, if felt appropriate, recommends to the Central Surveillance Unit for further investigation.
3. The genome sequencing analysis and clinico-epidemiological correlation established by IDSP is shared with MOH&FW, ICMR, DBT, CSIR and States/UTs for formulating and implementing requisite public health measures.
4. The new mutations/VoCs are cultured, and genomic studies are undertaken to see the impact on vaccine efficacy and immune escape properties.

Source:

https://dbtindia.gov.in/pressrelease/qa-indian-sars-cov-2-genomics-consortium-insacog

4. COVID-19: Delta and Delta Plus variants

Q. Why are frequent mutations seen in SARS-CoV-2 virus? When will the mutations stop?

A. SARS-CoV-2 can mutate due to the following reasons:

- Random error during replication of virus

- Immune pressure faced by the viruses after treatments such as convalescent plasma, vaccination or monoclonal antibodies (antibodies produced by a single clone of cells with identical antibody molecules)
- Uninterrupted transmission due to lack of COVID appropriate behaviour. Here the virus finds an excellent host to grow and becomes more fit and transmissible.

The virus will continue to mutate as long as the pandemic remains. This makes it all the more crucial to follow COVID appropriate behaviour.

Q. What are variants of interest (VoIs) and variants of concern (VoCs)?

A. When mutations happen – if there is any previous association with any other similar variant, which is felt to have an impact on public health – then it becomes a variant under investigation (VuI).

Once genetic markers are identified, which can have an association with a receptor binding domain or which have an implication on antibodies or neutralising assays, we call them variants of interest (VoIs).

The moment we get evidence for increased transmission through field-site and clinical correlations, it becomes a variant of concern (VoC). VoCs are those that have one or more of the following characteristics:

- Increased transmissibility
- Change in virulence/disease presentation
- Evading diagnostics, drugs and vaccines

The first VoC was announced by the UK where it was found. Currently there are four VoCs identified by the scientists – Alpha, Beta, Gamma and Delta.

Q. What are Delta and Delta Plus variants?

A. These are the names given to variants of SARS-CoV-2 virus, based on the mutations found in them. The World Health Organization (WHO) has recommended using letters of the Greek Alphabet, i.e., Alpha (B.1.1.7), Beta (B.1.351), Gamma (P.1), Delta (B.1.617), etc., to denote variants, for easier public understanding.

Delta variant, also known as SARS-CoV-2 B.1.617, has about 15-17 mutations. It was first reported in October 2020. More than 60 per cent of cases in Maharashtra in February 2021 pertained to Delta variants.

It is the Indian scientists who identified the Delta variant and submitted it to the global database. The Delta variant is classified as a VoC and has now spread to 80 countries, as per the WHO.

The Delta variant (B.1.617) has three subtypes B1.617.1, B.1.617.2 and B.1.617.3, of which B.1.617.1 and B.1.617.3 have been classified as VoI, while B.1.617.2 (Delta Plus) has been classified as a VoC.

Compared to the Delta variant, the Delta Plus variant has an additional mutation. This mutation is called the K417N mutation. 'Plus' means an additional mutation has happened to the Delta variant. It does not mean that the Delta Plus variant is more severe or highly transmissible than the Delta variant.

Q. Why has the Delta Plus variant (B.1.617.2) been classified as a VoC?

A. It has been classified as a VoC because of the following characteristics:

- Increased transmissibility
- Stronger binding to receptors of lung cells
- Potential reduction in monoclonal antibody response
- Potential post vaccination immune escape

Q. How often are these mutations studied in India?

A. Indian SARS-CoV-2 Genomics Consortium (INSACOG), coordinated by the Department of Biotechnology (DBT) along with the Union Health Ministry, ICMR, and CSIR, monitors the genomic variations in SARS-CoV-2 on a regular basis through a pan-India multi-laboratory network. It was set up with 10 national labs in December 2020 and has been expanded to 28 labs and 300 sentinel sites from where genomic samples are collected. The INSACOG hospital network looks at samples and informs INSACOG about the severity, clinical correlation, breakthrough infections and re-infections.

More than 65,000 samples have been taken from states and processed, while nearly 50,000 samples have been analysed of which 50 per cent have been reported to be VoCs.

Q. On what basis are the samples subjected to genome sequencing?

A. Sample selection is done under three broad categories:

1. International passengers (during the beginning of the pandemic)
2. Community surveillance (where RT-PCR samples report CT value less than 25)
3. Sentinel surveillance where samples are obtained from labs (to check transmission) and hospitals (to check severity)

When there is any public health impact noticed because of genetic mutation, then the same is monitored.

Q. What is the trend of VoCs circulating in India?

A. As per the latest data, 90 per cent of samples tested have been found to have Delta variants (B.1.617). However, B.1.1.7 strain, which was the most prevalent variant in India in the initial days of the pandemic, has decreased.

Q. Why is action regarding public health not taken immediately after noticing mutations in the virus?

A. It is not possible to say whether the mutations noticed will increase transmission. Also, until there is scientific evidence that proves a correlation between the rising number of cases and variant proportion, we cannot confirm there is a surge in the particular variant. Once mutations are found, it is analysed every week to find out if there is any such correlation between the surge of cases and variant proportion. Public health action can be taken only if scientific proofs for such correlation are available.

Once such correlation is established, it will help greatly to prepare in advance when such a variant is seen in another area/region.

Q. Do Covishield and Covaxin work against the variants of SARS-CoV-2?

A. Yes, Covishield and Covaxin are both effective against the Alpha, Beta, Gamma and Delta variants. Lab tests to check vaccine effectiveness on Delta Plus variants are ongoing.

Delta Plus variants: The virus has been isolated and is now being cultured at ICMR's National Institute of Virology, Pune. Laboratory tests to check vaccine effectiveness are ongoing and the results will be available in 7 to 10 days. This will be the first result in the world.

Q. What are the public health interventions being carried out to tackle these variants?

A. The public health interventions needed are the same, irrespective of the variants. The following measures are being taken:

- Cluster containment
- Isolation and treatment of cases
- Quarantining of contacts
- Ramping up vaccination

Q. Do public health strategies change as the virus mutates and more variants arise?

A. No, public health prevention strategies do not change with variants.

Q. Why is continuous monitoring of mutations important?

A. Continuous monitoring of mutations is important to track potential vaccine escape, increased transmissibility and disease severity.

Q. What does a common man do to protect self from these VoCs?

A. One must follow COVID appropriate behaviour, which includes wearing a mask properly, washing hands frequently and maintaining social distancing. The second wave is not over yet. It is possible to prevent a big third wave provided individuals and society practice protective behaviour. Further, test positivity rate must be closely monitored by each district. If the test positivity goes above 5 per cent, strict restrictions must be imposed.

Source:

https://pib.gov.in/PressReleseDetailm.aspx?PRID=1730875

5. COVID-19 vaccination for pregnant women

Q. Why is COVID-19 vaccine being recommended for pregnant women?

A. Pregnancy does not increase the risk to COVID-19 infection. Most pregnant women will be asymptomatic or have mild disease, but their health may deteriorate rapidly and that might

affect the foetus too. It is important that they take all precautions to protect themselves from COVID-19, including taking the vaccination against the same. It is, therefore, advised that a pregnant woman should take the COVID-19 vaccine.

Q. Who are at higher risk of getting infected with COVID-19?

A. Higher risk of infection involves with:

- A healthcare worker or a frontline worker
- A community with high or increasing rate of COVID-19 infections
- Those frequently exposed to people outside the household
- Those who have difficulty in complying with social distance if living in a crowded household

Q. How does COVID-19 affect the health of a pregnant woman?

A. Although most (>90 per cent) infected pregnant women recover without hospitalization, rapid deterioration in health may occur in a few. Symptomatic pregnant women appear to be at increased risk of severe disease and death. In severe disease, like all other patients, pregnant women may also need hospitalisation. Pregnant women with underlying medical conditions, for example, high blood pressure, diabetes, obesity, and age over 35 years are at higher risk of severe illness due to COVID-19.

Q. How does COVID-19 infection of pregnant women affect the baby?

A. Most (over 95 per cent) of newborns of COVID-19 positive mothers have been in good condition at birth. In some cases, COVID-19 infections in pregnancy may increase the possibility of a premature delivery; the baby's weight may be less than 2.5 kg; and in rare situations, the baby might die before birth.

Q. Which pregnant women are at a higher risk of developing complications after COVID-19 infection?

A. Pregnant women who are:

- Older than 35 years of age
- Obese
- Have an underlying medical condition such as diabetes or high blood pressure
- Have a history of clotting in the limbs

Q. If a pregnant woman has already had COVID-19, when should she be vaccinated?

A. In case a woman is infected with COVID-19 during the current pregnancy, then she should be vaccinated soon after the delivery.

Q. Are there any side effects of the COVID-19 vaccines that can either harm the pregnant woman or her foetus?

A. The available COVID-19 vaccines are safe and the vaccination protects pregnant women against COVID-19 like other individuals. Like any medicine a vaccine may have side effects, which are normally mild. After getting the vaccine, she can get mild fever, pain at the injection

site, or feel unwell for 1-3 days. The long-term adverse effects and safety of the vaccine for the foetus and the child born is not established yet. Very rarely, (one in one to five lakh people) the beneficiary may, after the COVID-19 vaccination, experience some of the following symptoms within 20 days after getting the injection, which may need immediate attention.

Q. When should the vaccine be given to the pregnant woman?

A. The COVID-19 vaccination schedule can be started any time during pregnancy.

Q. What other precautions should the pregnant woman take after vaccination?

A. Counsel the pregnant woman and her family members to continue to practice COVID appropriate behaviour: wearing double masks, frequent hand washing, maintaining physical distance, and avoiding crowded areas, to protect themselves and those around from spreading the COVID-19 infection.

Q. How does a pregnant woman register herself for the Covid-19 vaccination?

A. All pregnant women need to register themselves on the Co-WIN portal or may get themselves registered on-site at the COVID-19 vaccination centre. The process of registration for pregnant women remains the same as of the general population and as per the latest guidelines provided by the Ministry of Home and Family Welfare (MoHFW) from time to time.

Source:

https://www.mohfw.gov.in/pdf/OperationalGuidanceforCOVID19vaccinationofPregnantWoman.pdf

6. COVID-19 & Children

Q. What is the possibility of a third wave of COVID-19 in the coming months?

A. Pandemics are likely to occur in multiple waves, and each wave could vary in the number of cases and its duration. Eventually, most of the population may get immune by asymptomatic or symptomatic infections (herd immunity). Over time, the disease may die out or may become endemic in the community with low transmission rates.

Key Message: There is a possibility of a third wave, but it is difficult to predict its timing and severity.

Q. Are children at greater risk if the third wave strikes?

A. In the first wave, primarily the elderly and individuals with co-morbidities were affected with severe disease. In the current (second) wave, a large number of younger population (30-45 years) have developed severe disease as also those without co-morbidities. After the second wave is over, if we do not continue following COVID appropriate behaviour, the third wave, if it occurs, is likely to infect the remaining non-immune individuals and that may include children also. The latest sero survey (December 2020 to January 2021) showed that the percentage of infected children in the age group of 10-17 years was around 25 per cent, the same as adults. This indicates that while children are being infected like adults, they are not getting the severe disease.

Key Message: Children are as susceptible as adults and older individuals to develop an infection but not a severe disease. It is highly unlikely that the third wave will predominantly or exclusively affect children.

Q. Are children likely to suffer from severe disease as being witnessed in the adult population in the current wave?

A. Fortunately, children have been relatively less affected so far due to several factors. The most important reason is the lesser expression of specific receptors to which this virus binds to enter the host and also the immune system of the children. A very small percentage of infected children may develop moderate to severe disease. If there is a massive increase in the overall numbers of infected individuals, a larger number of children with moderate to severe disease may be seen. Apart from the infection, parents should watch out for mental health issues in children and keep a watch to prevent child abuse and violence. Also, it is worth limiting screen time and prepare children for safe school reopening as per the Indian Academy of Pediatrics (IAP) guidelines.

Key Message: Almost 90 per cent of the infections in children are mild/asymptomatic. Therefore, the incidence of severe disease is not high in children.

Q. Can we rule out the possibility of severe infections in children in the third wave?

A. As explained, the spectrum of illness is likely to be much less severe in children than adults; there is only a remote possibility of children being more severely affected than adults in the next wave. As per data collected during the first and second waves, severe COVID-19 infections in children were not reported and only in few cases they were admitted to ICU. However, we need to be watchful about how the mutant strains will behave. The dictum here is: better be ready and prepared for the worst and hope for the best!

Key Message: Severe COVID-19 cases in children are rare. Further, there is no evidence indicating that children will have severe disease in the third wave.

Q. Severe disease due to COVID-19 is already occurring in children. Why it is so?

A. Yes, a severe illness related to COVID-19 is known to occur in children. This includes pneumonia and multisystem inflammatory syndrome in children (MIS-C). However, COVID-19 pneumonia in children is uncommon as compared to adults. In some cases, after 2-6 weeks of asymptomatic or symptomatic COVID-19 infection, MIS-C may be seen due to immune dysregulation with the incidence of 1-2 cases per 100,000 population; some of these cases also may be severe. It's a treatable condition with a good outcome if diagnosed early. Also, most children suffering from MIS-C cannot transmit the infection to others.

Key Message: Children occasionally get the severe disease and may need ICU care, both during the acute illness and after 2-6 weeks due to MIS-C caused by COVID-19. But the majority are likely to recover if treated on time.

Q. What preparations are being made in case the third wave comes and affects the children?

A. Most affected children get a mild disease with fever and need supervised home care with monitoring. We have learned a lot about COVID-19 illness from our shared experiences in adult medicine in the last 15 months. IAP guidelines on the management of COVID-19 in children are in place, and paediatricians have been sensitised and trained on its management. We need to be ready for a more significant number of patients seeking consultations; educating the parents on different platforms regarding illness and warning signs; and arranging more COVID-19 wards for children with more special wards such as high-dependency units (HDUs) and intensive care units (ICUs). The preventive behaviours are the same for children. Parents should also be ideal role models for their children regarding mask etiquette, hand hygiene, and social distancing. Children

above the age of two to five years can be trained to use a mask; however, the adults have to follow the COVID-appropriate behaviour. IAP has also set guidelines for the safe reopening of schools for the safety of the children.

Key Message: We need to be prepared with more in-patient beds and intensive care beds for children. IAP has already developed the management protocol for disease categories in children. There is no reason to panic. Our preparations are in full swing.

Q. What is the plan for vaccinating children?

A. So far, the global data show that compared to children, older adults are a thousand times more likely to die from COVID-19 disease. So, it has been a priority to vaccinate the high-risk elderly age group first. Thereafter, the emphasis should be on adults who also have more severe diseases as compared to children. When there is the remote possibility of children getting affected, some countries consider vaccinating children and adolescents. The same vaccines being used in adults can be used in children only after adequate trials. One of the India-made vaccines will soon undergo trials in children, and if proven immunogenic and safe, it could be fast-tracked for mass vaccination in children.

Key Message: Children do get the severe disease, even if the number is small. Thus, there is no harm in considering vaccination for them. The safety and efficacy, however, are being assessed in trials for this age. The national expert group on vaccine administration for COVID-19 will develop a plan as and when new scientific data emerge.

Source

https://iapindia.org/pdf/hA5Gnpt_IQv63Bk_IAP%20view%20point%20for%203rd%20wave%20Covid%2022%20May%202021.pdf

7. COVID-19 & White Fungus infection

Q. What is White Fungus?

A. White Fungus, also known as candidiasis, is an opportunistic infection, which could spread fast to various body parts and, if not treated, could be serious. According to the Centre for Diseases Control and Prevention (CDC), White Fungus or invasive candidiasis can affect the blood, heart, brain, eyes, bones, or other parts of the body.

Q. Who are at high risk to get White Fungus infection?

A. White Fungus is all around us as it is found naturally in the environment. It primarily affects people with low immunity, who come in contact with objects that contain these fungal spores. For instance, COVID-19 patients on oxygen support can come in contact with these fungal spores if their ventilators and oxygen support equipment are not sanitised properly. Further, overuse of steroids and use of tap water in the humidifier attached to an oxygen cylinder can also heighten the risk of contracting White Fungus.

Q. Who can get infected by white fungus?

A. Invasive candidiasis is caused by a yeast (a type of fungus) called Candida. Candida can normally live inside the body, in areas like the mouth, throat, gut, and vagina, without causing any problems. However, individuals with low immunity, like patients recovering from a serious COVID-19 infection, are particularly at risk of contracting this fungal infection. In their bodies, the fungus can enter the bloodstream or internal organs to cause an infection.

People who are at high risk for developing this infection include those who:

- Have been admitted in the intensive care unit (ICU) for a prolonged period.
- Have weakened immune system (for example, people on cancer chemotherapy, people who have had an organ transplant, and people with low white blood cell counts).
- Have recently had surgery, especially multiple abdominal surgeries.
- Have recently received lots of antibiotics or steroids in the hospital.
- Receive total parenteral nutrition (food through a vein).
- Have kidney failure or are on hemodialysis.
- Have diabetes.
- Have a central venous catheter.

Q. Is White Fungus contagious?

A. White Fungus is not contagious in most cases, as it cannot spread directly from person to person. However, there exist some species of fungus that cause this infection on the skin. In such instances of external infection, the fungus can possibly be transferred from the patient to another individual who is at risk.

Q. What are the symptoms of White Fungus?

A. Only CT scans or X-rays can reveal and completely confirm the White Fungus infection. Health experts report that it is more dangerous than Black Fungus, as it affects the lungs as well as other parts of the body like the nails, skin, stomach, kidney, brain, private areas, and mouth.

Moreover, the White Fungus can also infect the lungs the same way COVID-19 does. In fact, patients who get infected with White Fungus displayed COVID-19-like symptoms despite having tested negative for the virus. According to some reports, the oxygen saturation level of one of the four patients infected with White Fungus dropped from normal levels. However, the oxygen levels became normal after the antifungal medication was administered.

Q. How can White Fungus be treated?

A. Patients infected with White Fungus should be examined carefully, perhaps with a fungus culture test of their phlegm or mucus, to detect the extent of fungal infection in their body. After detection of the infection, antifungal medications can be used to treat the patients. Such medications have led to an improvement in their condition. The type and dose of antifungal medication used to treat White Fungus will depend on the patient's age, immune status, location, and severity of the infection.

8. COVID-19 & Use of oxygen

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, which 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 (SpO_2) should be 95 per cent 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 per cent. The 'SpO_2' reading on a pulse oximeter shows the percentage of oxygen in the blood. If your home SpO_2 reading is lower than 94 per cent, 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 colour 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., face down to improve breathing and oxygenation. It has been shown as 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 per cent 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 increases 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 22nd April 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-19 patients.

Q. What are 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 per cent to 93 per cent 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 per cent 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 the 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 six minute walk test for COPD?

A. The six minute 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 six minutes without a break on an even surface and measure the SpO_2 level. It may fall 1-2 per cent, but consult a medical professional if it falls below 93 per cent.

Source:

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

9. COVID-19 & Therapeutics

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 pro-drug 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. Can Remdesivir 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. The 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 per cent 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.

10. COVID-19 & Black Fungus 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 mold 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 immuno-compromised 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
- Immuno-compromised 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. One can take the following precautions:

- 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

11. COVID-19 & Indoor Air

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 helps 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, Government 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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FEEDBACK FORM

COVID-19

Science & Technology Efforts in India

It has been more than a year since the COVID e-Newsletter started reaching you and we want to hear what you think about it. The information product is designed to keep you conversant about the services and efforts the country has put up on the face of the sudden eruption of the COVID-19 pandemic. Your opinion is vital so that we can make sure we are including what you want to read. Please fill in the form below and rest assured that the information you give will help shape future editions of your coveted newsletter.

I. How do you rate the following aspects of COVID e-Newsletter, focused on the second wave of the pandemic?

1. The overall appearance

😄Very Good 😊Good 😐Average ☹️Poor 😞Very Poor 😶No Opinion

2. Ease to read and flow of information

😄Very easy 😊Fairly easy 😐Not very easy ☹️Not at all easy

For suggestions and feedback, click on:
https://www.indiascienceandtechnology.gov.in/covid-newsletter/feedback-form

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Monthly Edition | March 2022

VOL. V | ISSUE 4

COVID-19

Science & Technology Efforts in India

Together we can and we will beat the pandemic out

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