COVID-19 BULLETIN

2 JUNE 2020

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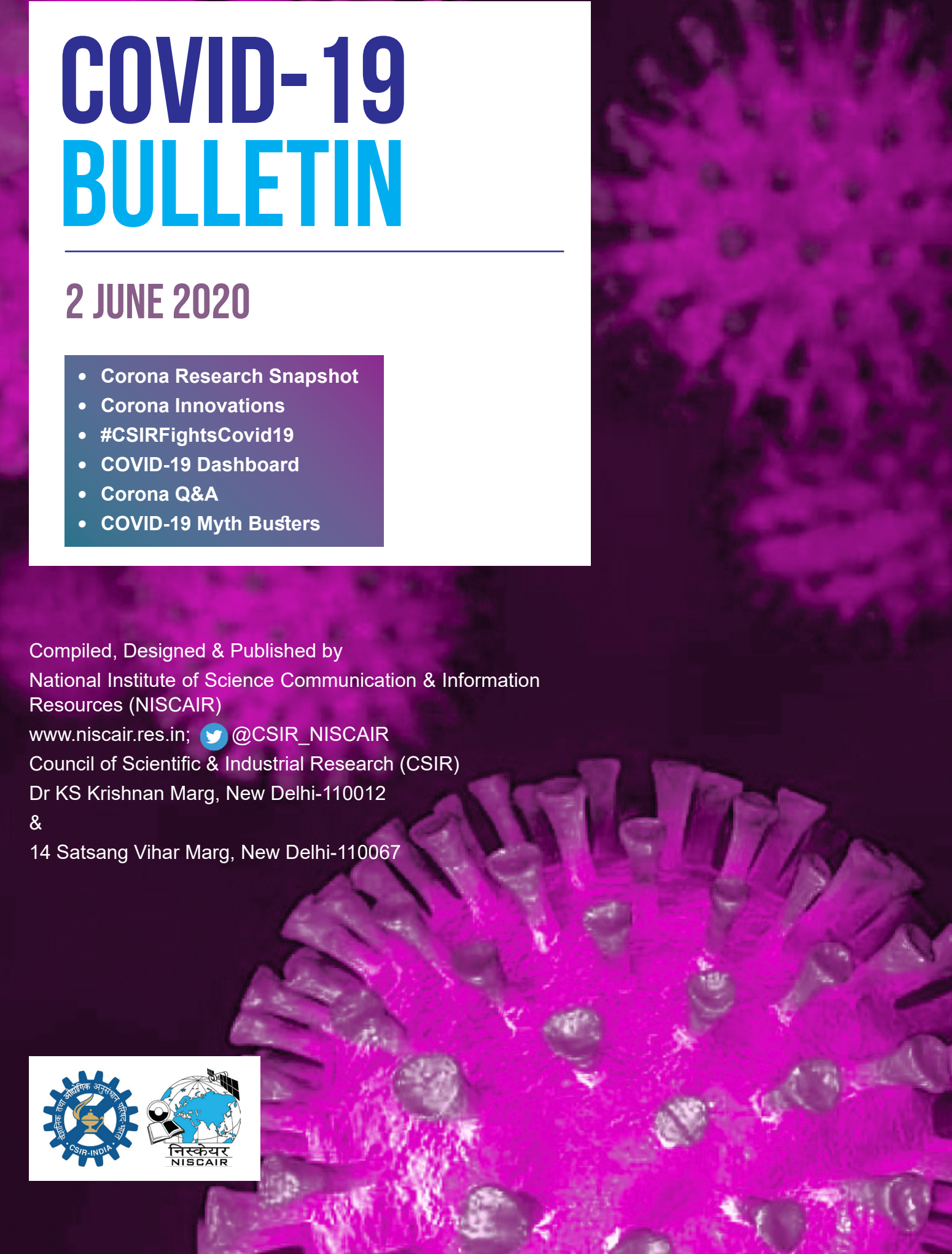


CORONA RESEARCH SNAPSHOT

Remdesivir helpful in decreasing the recovery period of COVID-19 patients

(Representative image)

A peer reviewed study recently published in the *New England Journal of Medicine* confirms that Remdesivir is helpful in decreasing the time required for recovery from the COVID-19 infection among critical patients. This study is based on data provided by Adaptive COVID-19 Treatment Trial (ACTT), sponsored by National Institute of Allergy and Infectious Diseases, National Institute of Health-USA. The study was performed by following double blinded mechanism in which doctors and patients both were unaware of who was being given Remdesivir or the control sample (*i.e.* standard prescription). The study involved more than 1000 patients from 10 countries in a 58-day randomised trial, in which anti-viral Remdesivir was given intravenously. The data suggests that the median time for recovery was 11 days for patients who had taken Remdesivir in comparison to 15 days for those who were given the standard prescription. National Institute of Allergy and Infectious Diseases has already started a clinical trial (termed as ACTT-2) to evaluate Remdesivir with an anti-inflammatory drug *baricitinib* to improve its performance.

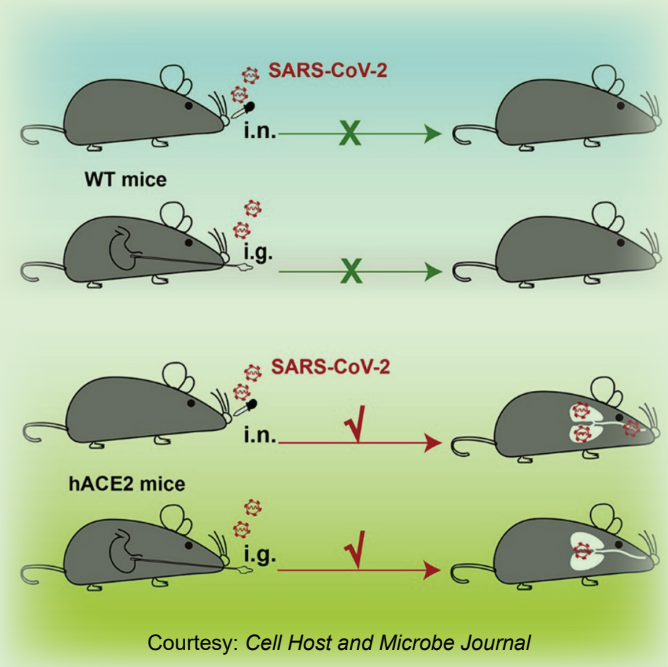
(Source: *New England Journal of Medicine*, DOI: 10.1056/NEJMoa2007764)

Prevent indoor airborne transmission of COVID-19 virus

The water droplets sneezed or coughed by COVID-19 patients are the main transmitters of COVID-19. The virus size is more than 100 nm but it comes out of the mouth with bigger water droplets. These expiratory droplets also contain water, salts and other organic material. The remaining particulate matter becomes light and gets suspended in the air when water content of the droplets evaporates. Thus the virus concentration in the air increases with time which subsequently increases the risk of airborne transmission of COVID-19. Researchers from Surrey's Global Centre for Clean Air Research (GCARE) and Australia's Queensland University and Technology claim that inadequate ventilation in the offices and homes can increase the risk of airborne transmission of COVID-19. The study is already published in the *City and Environment Interactions* Journal after peer review.

(Source: *City and Environment Interactions*, DOI: 10.1016/j.cacint.2020.100033)

Researchers engineer a mouse model that exhibits features observed in infected humans with COVID-19



Courtesy: *Cell Host and Microbe Journal*

The researchers were aiming to engineer a mouse model that could mimic humans during the COVID-19 infection. The mouse models are used to study the mechanisms of viral infection and transmission. The Chinese researchers used CRIPSR/Cas9 to generate a mouse model which is able to express hACE2 receptors. The virus uses these receptors as a key to enter the human cells. In comparison to other mice models, this model is generated by inserting it into a specific site on the X-chromosome, which could completely replace the mouse protein. The researchers claim that it is a genetically stable model and very much similar to a human. When this mouse model was infected with COVID-19 *via* nose, it exhibited the robust viral RNA replication in the lung, trachea and even in the brain (which is occurring randomly in humans). This mouse model also exhibited development of interstitial pneumonia, which affects the tissue and space around the air sacs of the lungs. Interestingly, older mice showed severe lung damage in comparison to young mice. These models are being considered important in testing a vaccine for preliminary trials.

(Source: *Cell Host & Microbe*; DOI: 10.1016/j.chom.2020.05.020)

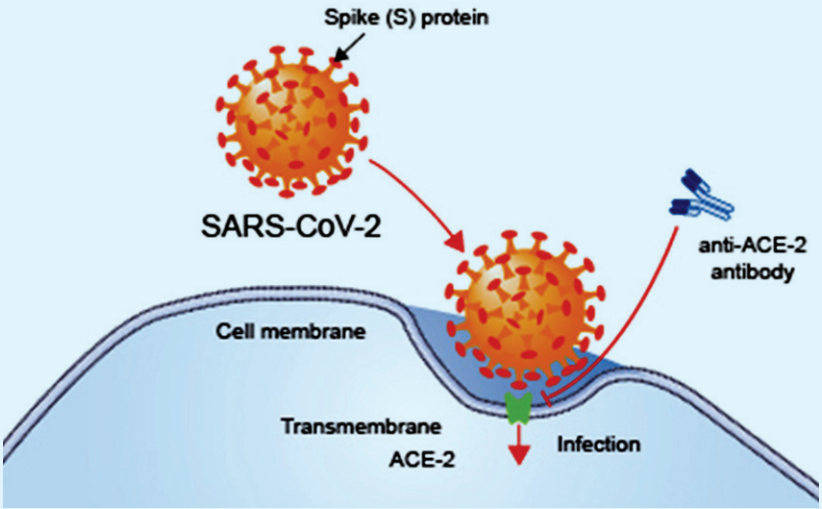
Altered mental status and stroke common neurological symptoms in novel Coronavirus patients

Researchers from USA and Italy have studied the neurological symptoms and imaging data from 725 hospitalized COVID-19 patients. Out of these a small number of patients (108 of 725 patients; 15% of the total) developed neurological symptoms that could be detected during brain imaging; 59% of the patients reported an altered mental state and rest of the patients experienced strokes among those 15% cases with neurological symptoms. These patients also experienced headache (12%), dizziness (4%) and seizure (9%) including main symptoms. The authors claim that the correlations and conclusions of this study will help doctors notice the signs of COVID-19 earlier in the patients. This field requires more detailed and comprehensive study to understand better the correlation of brain and COVID-19. The findings of the study are published in the journal Radiology after peer review.

(Source: *Radiology*, DOI: 10.1148/radiol.2020201933)

Two human antibodies found to block COVID-19 receptor binding sites

In a collaborative effort, a group of scientists in China isolated two human monoclonal antibodies, which are potent against COVID-19 infection in rhesus monkeys, from COVID-19 patients. These two antibodies are CA1 and CB6. CB6 is found to create hindrance in the binding process of COVID-19 on ACE2 receptors which are the keys to penetrate the barrier of the cell membrane. The authors of the study suggested further advanced clinical trials for these antibodies. This study is recently published in *Nature* after peer review.



COVID-19 uses the ACE2 receptor to penetrate the cell membrane

(Source: *Nature*, DOI: 10.1038/s41586-020-2381-y)

High psychological impact of COVID-19 on ophthalmologists: Study

An online study has demonstrated that a significantly high proportion of ophthalmologists were affected psychologically as they are at an increased risk of close contact with the patient's eyes and face. The study has been conducted by L.V. Prasad Eye Institute (LVPEI) in collaboration with the All India Ophthalmological Society (AIOS) and The George Institute for Global Health, India. The objective of the study was to evaluate the psychological impact of the COVID-19 crisis on trainees and practising ophthalmologists in India during the lockdown. The findings of this study are in consonance with studies done globally on health workers, which have shown that the mental health impact of COVID-19 is very high and it needs to be addressed immediately.

(Source: *India Science Wire)*

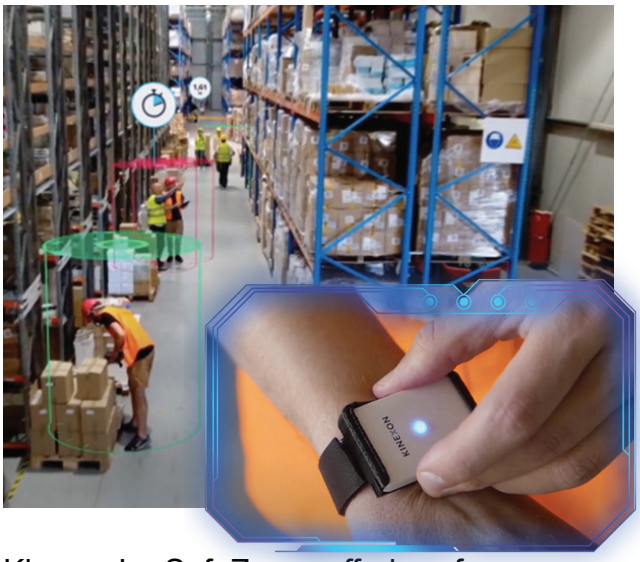
Placenta in COVID-19 infected women exhibits abnormal blood flow between mothers and their babies

Northwestern University scientists have pointed out that a type of injury has been observed in the placenta of COVID-19 infected pregnant women in spite of their normal deliveries. The researchers are still unable to observe any negative effect on life of the babies due to the injuries in the placenta but it is suggested that the health of pregnant women must be monitored more seriously in case of COVID-19 infection. The authors of the research paper mentioned that that in spite of a smaller study, it provides a preliminary glimpse in to how COVID-19 affects the placenta which can further affect the health of both mother and baby in case of infection. Placenta is the first organ to develop in the mother's womb. It is also considered as the lungs, gut, kidney and liver of the fetus.

(Source: *American Journal of Clinical Pathology*, DOI: 10.1093/ajcp/aqaa089)

CORONA INNOVATIONS

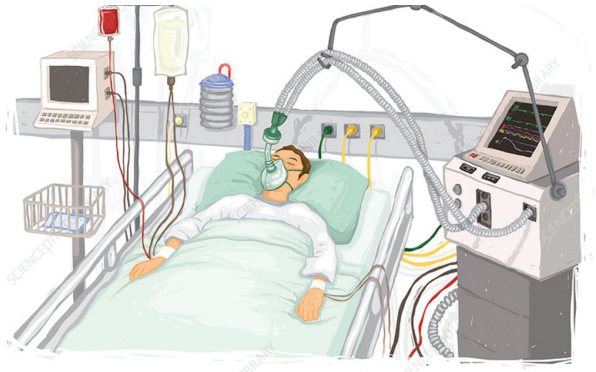
Technology to safeguard employees



Kinexon's SafeZone offering focuses on helping companies maintain or restart their business amidst the COVID-19 pandemic by leveraging digital technology designed to help combat the virus. It not only keeps workers protected with an ultra-precise physical distancing sensor but also helps trace the chain of infection. The core element of this technology is a lightweight wearable sensor, the Kinexon SafeTag. A very accurate and ultra-wideband (UWB) technology is used the SafeTag. The sensor immediately warns the user as soon as the minimum physical distance to another person is breached. Another audible warning is emitted if the two employees have an extensive critical contact period. In this technology, the minimum physical distance and time duration of a critical contact period can be adjusted. In the system, each sensor is registered with a unique ID but is not assigned to a specific person.

(Source: *https://www.ehstoday.com)*

Artificial Ventilator to combat COVID-19 pandemic



Barcelona Hub and YGL Javier Garcia Martinez have produced a scalable artificial ventilator to ease pressure on hospitals amid acute shortages of PPEs. In this device, certified parts are used that are readily available in medical facilities and online stores. Three hospitals are already testing this device in their ICUs. The team has produced eight prototypes and procured funding to develop 25 additional devices.

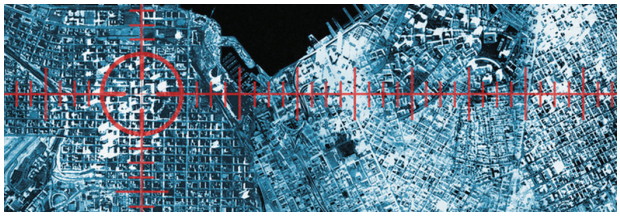
(Source: *https://www.globalpolicyjournal.com)*

Virtual pods reducing risk of viral infection

Cognizant Softvision has developed its *Virtual Pod* that helps reduce the risk of viral infection during the pandemic of COVID-19. The Virtual Pod has four key qualities: 1. Community based (vs. individuals based); 2. The 'right' results vs. 'are they in X location'; 3. Off premise, but always within reach; 4. Enabling the limits of velocity, quality, autonomy and product KPIs in new, unique and engaging ways.

(Source: *https://www.industryweek.com*)

Improving containment efforts



The WISER device may be used by any medical professional, patient, or hospital visitor. The wearer of this device creates a point-by-point, time-stamped trail of motion. It can also deliver the same data for tagged objects (such as endoscopes or any other medical implements) likely to be associated with contamination. This data shows who has been in contact with whom and for how long and thus enables visualizing how the infection might spread. It shows the areas which have experienced proximal exposure from people or objects likely to need decontamination protocols. It allows the end users to mark restricted areas or areas where actually disinfection is required.

(Source: *https://www.industryweek.com*)

Indigenous design for PPE

The Textiles Committee under the Ministry of Textiles has launched an indigenous testing equipment for Personal Protection Equipment (PPE) to test and certify PPE body coveralls required for COVID-19 warriors. The equipment is called Synthetic Blood Penetration Testing Equipment which has been conceptualized and designed indigenously to test the resistance of PPE materials to penetration by synthetic blood.

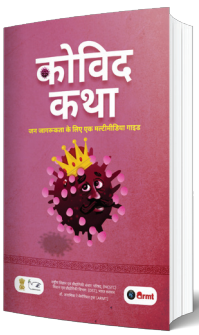
(Source: *indiaeducationdiary.in)*

UV-C disinfectant systems

Faridabad based APL Machinery Private Limited has developed a UV-C Disinfectant System to combat COVID-19. The company is engaged in manufacturing of a full range of UV Coating & Curing Systems and Screen Printing Machines. The system is exceptionally useful in rapid and chemical-free disinfection of viruses and bacteria; hygiene and infection control; fluorescent inspection; and tanning. The disinfectant system with five different products (UV-C BOX, UV-C Chambers, UV-C handheld disinfectant, UV-C Disinfection Conveyor and UV-C blaster) will help in diverse sanitisation which is the need of the hour.

(Source: *technuter.com)*

COVID Katha in Hindi



The National Council for Science & Technology Communication (NCSTC), DST in association with Dr Anamika Ray Memorial Trust, has brought out the Hindi version of the Popular Multimedia Guide for Mass Awareness carrying important information on A-to-Z of COVID-19 pandemic. The English version has already been released early this month.

(Source: *PIB)*

CeNS develops cup-shaped face masks

Researchers at the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru have developed a cup-shaped design (patent filed) of a mask that helps to create enough space in front of the mouth while speaking. It has been transferred to a Bengaluru-based company for mass production. This snug fit mask causes no speech distortion, no fogging on glasses and packs well all around, leaving practically no room for leakage while breathing. Another important advantage is its high breathability allowing one to wear it without any discomfort.
(Source: *dst.gov.in)*

IIT-Guwahati students develop low-cost devices to fight COVID-19

- **Heat-based sanitizer trunk** to disinfect household items including clothes, papers, currency notes wallets, etc.

- **Light-weight injection mould** for mass manufacturing of face shields to cater to the need of hospitals. It is recyclable, reusable and autoclavable.
- **Disinfectant tunnel** enabling full-body disinfection for an individual at a time. The tunnel could be installed at confined places.

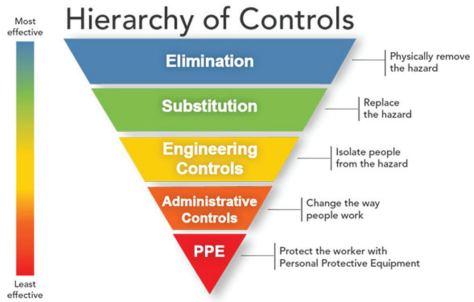
- **Foot-operated hand-sanitisation system** to prevent contamination by hands.

(Source: *ndtv.com)*

Hierarchy of Controls

Controlling exposures to occupational hazards is the fundamental method of protecting workers. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective control solutions.

Source: *www.cdc.gov*



#CSIRFightsCovid19

CSIR has mounted a strategic, well-coordinated and integrated approach towards mitigating the Coronavirus outbreak ranging from containing the spread of the virus by providing sanitisation and disinfection solutions to equipping the frontline workers and health warriors with protective gear, and from exploring repurposing of existing drugs to discovering new drugs and vaccines. Some major developments this week.

- Intending to simplify the RT-PCR based diagnostic testing, CSIR-CCMB has developed a method without the first tedious step of RNA extraction.
- CSIR-CLRI in Chennai has become the latest lab to join the initiative of testing patients of samples.
- The pilot study on community surveillance in Kolar has shown the value of a combined serology plus RT-PCR intelligent strategy, informed by virtual data. After the pilot study on digital surveillance in Kolar, CSIR is planning to do the next pilot surveillance in Jamshedpur and NCR.
- Three CSIR labs, CSIR-CCMB in Hyderabad, CSIR-IGIB in Delhi, and CSIR-IMTech Chandigarh have been designated as bio-repositories for SARS-CoV-2 viral samples. This will help in the development of indigenous diagnostics, therapeutics and vaccines.
- The CSIR and AICTE with the support of the Principal Scientific Adviser of the Government of India have launched a hackathon for *in silico* drug discovery for Covid-19 disease.
- CSIR-CCMB has established stable cultures of SARS-CoV-2 from patients' samples. The ability to culture the virus in the lab opens up the potential to work towards vaccines, antibody development and testing of drug candidates.
- CSIR-CECRI's tri-layered Face Mask with antimicrobial and hydrophobic coating has received certification from SITRA.
- Beta version of Aarogyapath, the National Healthcare Supply Chain Management System conceptualized by CSIR, has been developed and is expected to be launched soon.

DIGITAL AND MOLECULAR SURVEILLANCE

Surveillance at the level of the virus, humans, and geographical origins and distributions is a critical step in combating Covid-19. While *molecular surveillance* involves large-scale sequencing of viral genomes, *digital surveillance* utilizes big data at the population level. CSIR is using digital and molecular methods to conduct surveillance using a three-pronged approach; (i) gathering information about the virus (ii) pooled testing for greater outreach (iii) patient-centric approach

- **Community surveillance:** The report of the community surveillance that was carried out in Kolar was submitted to PMO via the office of the PSA and the empowered committee for digital apps. The study has shown the value of a combined serology plus RT-PCR intelligent strategy, informed by virtual data. After the pilot study on digital surveillance in Kolar, CSIR is planning to do the next pilot surveillance in Jamshedpur and Delhi-NCR.

- **Viral sequencing:** CSIR has set a target of sequencing 500 viral genomes of which 250 have been completed. During the week, sequencing of another 100 samples was initiated and it is in progress. During the week, CSIR-CCMB submitted 65 sequences to GISAID.

- **CSIR-IGIB** has arranged for 500 more known positives that are planned to be taken up under a new barcoded 3000-6000 sample sequencing protocol, which will be a combination of surveillance and sequencing. This will take us close to the 1000 mark when combined with efforts from other institutes.

- **CSIR-CCMB** has established connections with Andaman and Kerala for viral samples. Fifty host blood samples stratified as asymptomatic/severe are being collected. They will be processed for host genome sequencing. ·
- **CSIR-CLRI** has commenced testing for COVID-19 based on samples collected by Tamil Nadu State Government.

RAPID AND ECONOMICAL DIAGNOSIS

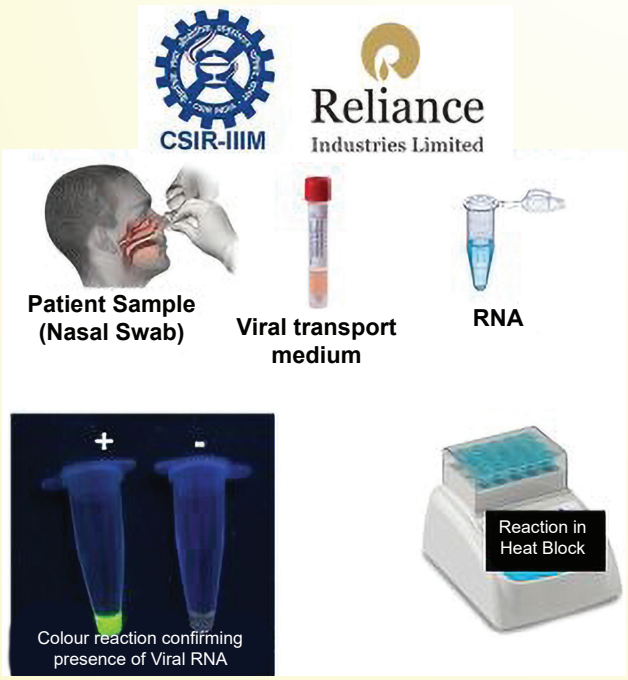
The key to flattening the curve of growth in Coronavirus cases is the detection of the infected at the earliest and isolating them. A combination of digital and molecular surveillance with rapid diagnosis is the need and CSIR is striving towards that using multiple strategies.

Till date, CSIR laboratories have tested more than 25,000 samples for COVID-19, which includes the 6736 tested in this week. In addition to this CSIR labs have also facilitated testing of 13500samples in the government hospitals around them. The data on testing conducted by CSIR labs during the week is given below:

CSIR Labs	Number of COVID tests during 22 May-28 May 2020
CSIR-IIIM	1654
CSIR-IMTECH	73
CSIR-IHBT	1828
CSIR-NEERI	457
CSIR-IITR	1458
CSIR-CCMB	378
CSIR-CDRI	888
Total	**6736**

- A technique for RT-PCR Test without the step of RNA extraction has been developed by CSIR-CCMB. Sampling is through the dry swab method. Using a dry swab, the new method has shown 100% concordance with a normal RT-PCR test. The test will save costly reagents and VDM and can be positioned as a Screening Test. It will be validated independently at CSIR-IMTECH and CSIR-CCMB will approach ICMR for approval.

- CSIR-IIIM has partnered with Reliance Industries Limited (RIL) to develop and scale-up a new Reverse Transcriptase-Loop Mediated Isothermal Amplification (RT-LAMP) based COVID-19 diagnostic kit for which a formal MOU has also been signed between CSIR-IIIM, Jammu and RIL. Th COVID-19 RT-LAMP test is a nucleic acid-based test carried out from nasal/throat swab samples from patients. The test recipe has been developed and successfully demonstrated using synthetic templates. It is a rapid (45-60 min), cost-effective and accurate test. It has been tested with a small number of patients' samples and validating the kit on more number of patient samples is planned and will be done together with RIL.



- CSIR-CCMB is sequencing 40 viral samples including few grown in cell culture. This will help us in understanding whether the virus is mutating in culture conditions.

- Three CSIR labs, CSIR-CCMB in Hyderabad, CSIR-IGIB in Delhi and CSIR-IMTech Chandigarh have been designated bio-repositories for SARS-CoV-2 viral samples. This will help in the development of indigenous diagnostics, therapeutics and vaccines and research to better understand the COVID-19 disease in the Indian scenario.

REPURPOSED DRUGS/NEW DRUGS/ VACCINES/AYUSH PRODUCTS

To combat the virus, CSIR is exploring all avenues and supporting new ideas that have a clear deployment strategy. CSIR has further defined its strategy in this vertical by setting up focused groups to look at multiple pathways for developing drugs: i) Molecular modelling of drugs; ii) Host-target interactions; iii) Crystal engineering; iv) Batch to continuous process; v) In-silico screening of existing drugs and natural products; vi) Scouting for non-infringing routes, and vii) Host-dependent pathways for APIs.

- **Repurposed Drugs:** CSIR is working with Cipla and other industries for leading repurposed drug candidates Remedisivir and Favipiravir by synthesizing API and Key Starting Material and providing to the industry.

- Remedisivir has received emergency approval by FDA and Gilead has given voluntary license to several Indian companies.
- Cipla has received approval for clinical trials of Favipiravir which are set to begin soon and CSIR-IICT is working with Cipla.

Drug	Indication
Umifenovir	Broad-spectrum Antiviral
Baricitinib	Rheumatoid Arthritis
Ruxotinib	Myelofibrosis
R-20-0001	Anti-hypertensive
Camostat mesylate	Chronic pancreatitis & postoperative reflux
Niclosamide	Influenza A and influenza B flu
Ribavirin	RSV infection, hepatitis C
Tilorone	Oral Synthetic interferon inducer
EID 1931 & 2801	SARS and MERS
Galidesivir	Broad-spectrum Antiviral
Centhaquin	Hypotensive agent

Other Drugs in Pipeline

- **Fixed Dose Combination Drugs:** CSIR-NCL has identified 3 FDC (fixed-dose combinations) from the antiviral drugs "vir" category based on *in silico* docking and the binding of these molecules to SARS-CoV2 receptor targets. These FDC drugs are already marketed by Indian generic manufacturers and readily available in India.

- **Batch to continuous process:** CSIR-NCL is in talks with several pharmaceutical companies on CSIR processes related to key starting materials and drug intermediates. Smaller and compact plants which include synthesis, filtration, purification, etc. are desirable for the modern and sustainable chemical industry. CSIR-NCL is working on the idea of converting batch processes to continuous processes to bring in sustainability, cost-effectiveness and increased production volumes.

- **Identification of new drugs:** CSIR-CDRI has purified two protein drug targets: m-pro and pl-pro. Binding studies with about 50 selected compounds have been taken up. CSIR-CDRI is also working on Spike-ACE2 interaction disruption assays. Compounds that show significant inhibition in these in vitro assays will be tested for anti-viral activity at CSIR-CCMB.

- **Drug hackathon:** CSIR and All India Council for Technical Education (AICTE) have launched a hackathon for drug discovery for Covid-19 disease. The Principal Scientific Adviser of the Government of India is supporting the hackathon. The ideas holding potential that emerge from the hackathon will be developed by CSIR labs, startups and any other interested organization. Indian students and researchers from across the world can participate in the competition.

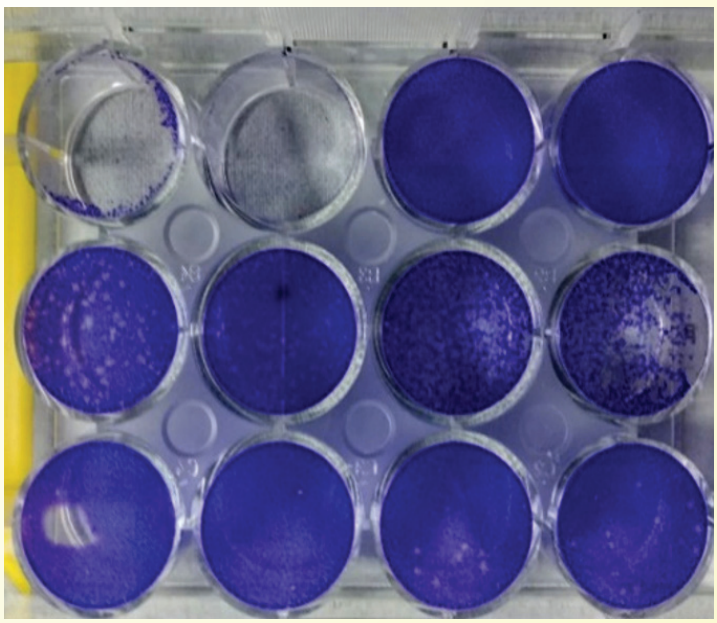
- **Sepsivac clinical trials**: CSIR and Cadila Pharmaceuticals are conducting three clinical trials to evaluate the efficacy of an existing gram-negative sepsis drug, called Sepisvac (Mw) for COVID 19. The three trials are on critically ill Covid19 patients; hospitalized (but not critically ill) Covid19 patients; and high-risk contacts of Covid19. The clinical trial on critically ill Covid19 patients is going on at AIIMS-Bhopal, AIIMS-New Delhi and PGI Chandigarh.

- **Clinical trial of ACQH:** CSIR and Sun Pharma have received approval for Phase 2 clinical trial of a Phytopharmaceutical formulation, ACQH, developed by CSIR-IIIM and DBT-ICGEB for dengue. This is the first phytopharmaceutical to receive clinical approval and trial will start soon.

- **Clinical trials on Ayush drugs:** CSIR with ICMR and Ministry of Ayush is conducting clinical trials for Ayurveda interventions as prophylaxis and as an add-on to standard care to COVID-19. They include Ayurvedic medicines such as Ashwagandha, Yashtimadhu, Guduchi Pippali, and a polyherbal formulation (Ayush-64). Trials to start soon.

- **Clinical trials on convalescent plasma therapy**: CSIR-IICB has received approval for a clinical trial for plasma therapy and trials are going on in West Bengal.

- **Isolated infectious viruses from patient samples hold potential:** CSIR-Centre for Cellular and Molecular Biology (CCMB) has established stable cultures of coronavirus (SARS-CoV-2) from patients' samples. Virologists at CCMB have isolated infectious viruses from several isolates. The ability to culture the virus in the lab opens up the potential to work towards vaccine development and testing of potential drugs to fight COVID-19. The potential uses of cultured SARS-CoV-2 include vaccines, development of antibodies, testing of antibodies and drug screening. It can also be used for testing of various disinfectants and instruments which are expected to have anti-viral activity.



Growing virus under BSL-3 conditions and viruses growing as white translucent plaques among blue live Vero cells

HOSPITAL ASSISTIVE DEVICES AND PPEs

Ever since the pandemic reared its devastating head in the country, CSIR has been introducing low-cost and effective hospital assistive devices and PPEs and consistently improving their efficiency and design. CSIR has made considerable progress in this area and many technologies and designs have been transferred to the industry while some are at the stage of beta testing, which will be followed by certification.

- **BiPAP Ventilator:** Agreement has been signed between CSIR-NAL and Manipal Hospital for doing a clinical trial on the BiPAP Ventilator System developed by CSIR-NAL. The clinical trial will start soon.

- **Respiratory Assistance Intervention Device (Respi-AID):** A beta trial has been completed for Respi-aid from CSIR-CSIO. The clinical trial will be done after technology transfers to the company.

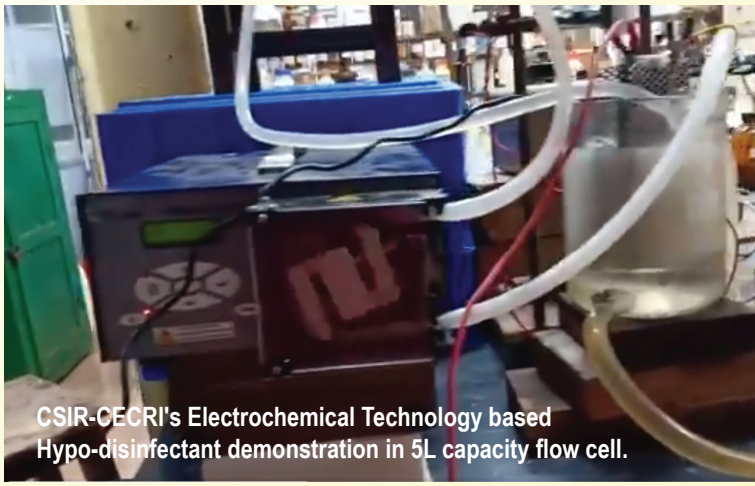
- **Oxygen Enrichment Unit:** This has been developed by CSIR-NCL and is undergoing clinical trials.

- **Coveralls:** Production of Coveralls developed by CSIR-NAL is going on as per plan with 5000 being produced each day. **40,000 pieces have been supplied to HLL.** The Karnataka State Government has requested 500 samples of Coverall from NAL.

- **Herbal Sanitizer:** CSIR-CIMAP transferred its herbal sanitizer (Hankool) technology to M/s Sai International Pvt. Ltd., Lucknow.

- **Herbal Inhaler**: CSIR-NBRI's herbal inhaler technology is ready for transfer to the industry. The inhaler based on ayurvedic formulation, when sprayed on masks makes breathing easier by decongesting the nasal passage.

- **Disinfectant:** CSIR-CECRI has developed a technology for electrochemical synthesis of hypochlorite. The disinfectant is in high demand during the pandemic. The institute is ready to transfer the technology to an interested MSME. The institute has also developed an electrochemical technology-based hypo-disinfectant 5L capacity flow cell.



CSIR-CECRI's Electrochemical Technology based Hypo-disinfectant demonstration in 5L capacity flow cell.

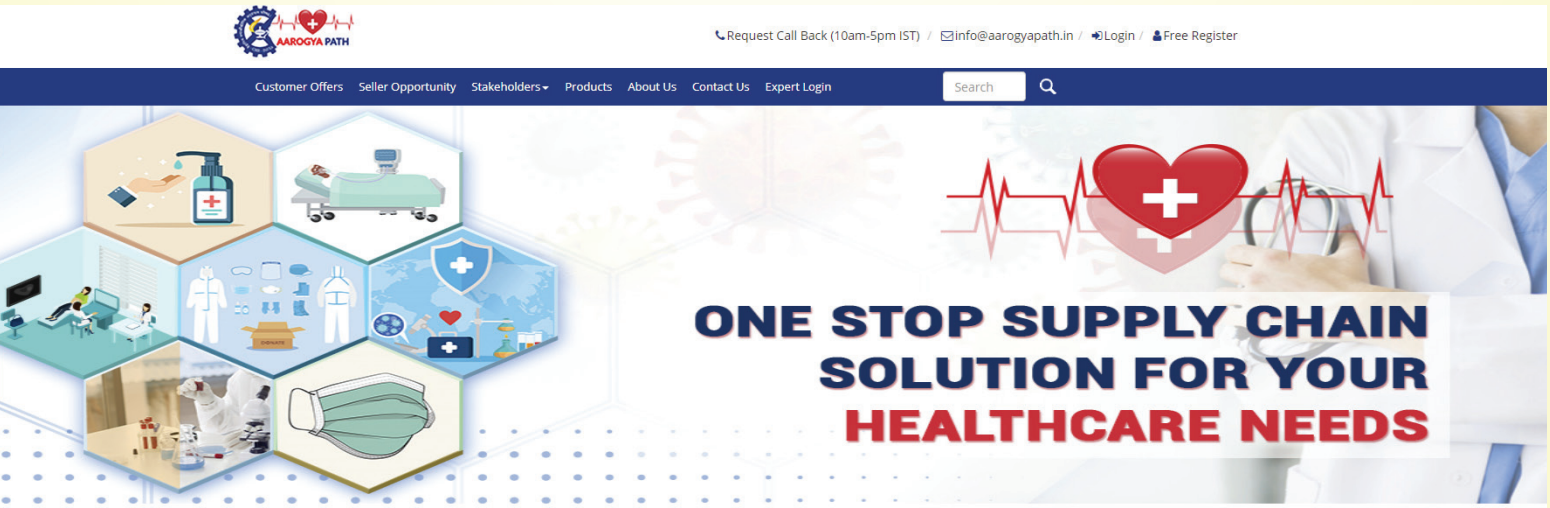
- **Indoor disinfection unit:** CSIR-CMERI's technologies on indoor disinfection unit, the Battery Powered Disinfectant Sprayer (BPDS) and its Portable Soap-cum-Water Dispenser, were transferred to an SSI for industrial production.

- **Face Mask**: CSIR-CECRI's tri-layered Face Mask with antimicrobial and hydrophobic coating received certification from SITRA.

CSIR SUPPLY CHAIN & LOGISTICS SUPPORT

- CSIR Supply Chain & Logistics Support vertical of CSIR Team is working with pan-CSIR lab/units scientists, TCS and other third parties to set up information management and forecasting databases at a national level to capture demand and supply scenarios for key items that are required to address the COVID19 emergency.

- During the week the regional inventory document was completed and preparation for **Aarogyapath** launch is underway. Aarogyapath is the National Healthcare Supply Chain Management System which has been conceptualized to address COVID-19 and any future national pandemic.



Aarogyapath online portal

CSIR Media Coverage

'During this coronavirus pandemic, CSIR decided to partner with corporates ... we're glad ice has been broken now'

India's Council of Scientific & Industrial Research (CSIR), with 38 national labs under it, works on a wide spectrum of areas. An immediate priority for the organisation which comes under the purview of the science ministry is to contribute solutions in the fight against Covid-19. CSIR's director general Shekhar C Mande speaks to Rohan Dua:

Q&A

■ Where does CSIR stand in its efforts to find ways to combat Covid-19?

I can today proudly say we started working on our R&D projects before WHO guidelines on March 11 calling Covid-19 a pandemic. As of today, we have had multiple rounds of discussions with our 30 directors under CSIR across India and five verticals. We have major achievements. For instance, we have now isolated 200 sequences of coronavirus in India to understand its mutation. This is complete genome sequencing. We will now move to a target of 1,000 sequences. In terms of diagnostics, we have conceived a remarkable paper based 30 minute process called Feluda test for coronavirus sampling. It's easier than RT-PCR test and we are hoping its commercial use will happen in hospitals soon. As far as drugs are concerned, we have revived an old drug Sepivac-MW to treat critical Covid patients and results will be out soon. We also started trials of Favipiravir drug. It's an inhibitor of the virus. And we are also doing trials of Ayush for formulations.

■ Has there been any particular [illegible] or vaccine research for the novel coronavirus?

We have funded a lot of programmes in the last three weeks alone in India at our CSIR labs. For instance, we are working on monoclonal antibodies vaccines that are proteins and can restore, enhance or mimic the immune system's attack. It can play a crucial role in coronavirus treatment. For this, we have funded National Centre for Cell Science, Pune, and IIT Indore along with Bharat Biotech.

■ Is there support of any international group of scientists on any of these R&D projects?

Our emphasis has been that whether drugs, vaccines or diagnostic tests for Covid they will bear a Make in India mark. Even the chemicals that go into making drugs will not be imported.

Many R&D agencies and private companies working on ventilators realised that pressure sensors or other components were being imported from China.

We have just managed to build a BiPap ventilator. This ventilator has been developed by CSIR-National Aerospace Laboratories, Bengaluru. So, overall, it's just Indian scientists who are working on all such projects.

■ Can treatments coming from alternate [illegible] any role in relation to modern day drugs in controlling the spread of coronavirus? Aren't you working with Ayush ministry to validate four formulations?

Why not? They can be add-on therapy. The four Ayush formulations are Ashwagandha, Yastimadhu, Guduchi pippali and last is Ayush 64. They are known to have anti-inflammatory properties. The Union Ayush ministry was keen we must look at their properties from the perspective of modern science. Some of these drugs are prophylactic and can be used to prevent certain Covid symptoms but clinical trials are set to begin now. We have to take ethical approvals from hospitals.

■ Why is CSIR keen on partnering with big pharmaceutical firms?

Even as our focus was on Make in India, we felt we needed to have an industry partner. Because, CSIR alone doesn't have capability of scaling up operations and marketing a product. We roped in Intel India, Tata Sons, Sun Pharma, Cadila, BHEL and Reliance. *All I had to do was* write a letter of expression of interest and people like RIL chairman Mukesh Ambani and Tata group representatives responded promptly. So for our Feluda paper test, Tata Sons agreed to market it. During this pandemic, we have now decided to partner with corporates for a long duration, ending our long standing inability to do so in the past. There used to be a blame game in the past. We are glad ice has been broken now during this crisis.

■ How much money is going into R&D? Is it a PPP model?

We are fortunate industries are putting their own money. We are working as knowledge partners. But CSIR too has its pool of finances which we have put into projects.

■ With social distancing norms in place, how are your lab scientists communicating or working with each other?

All CSIR labs with strategy groups meet every evening. Video conferences are one way but we often meet in person. For designs and testing, scientists have to work in laboratories with precautions. When we made an app called Kisan Sabha connecting farmers with transporters, we had to do a lot of brainstorming with the involvement of people who had to meet in person. There was no other way.

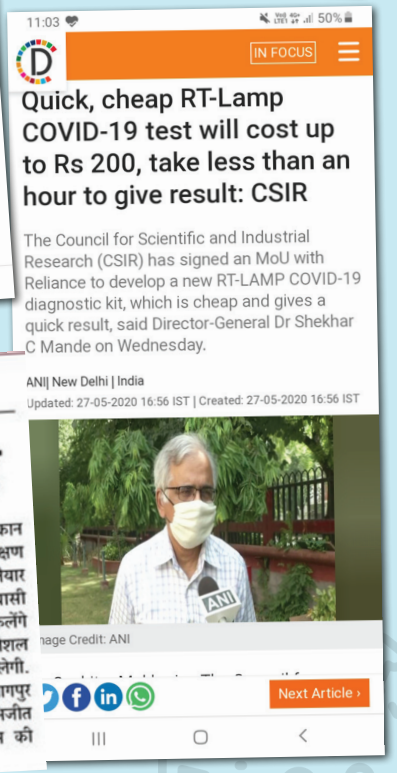
dilbert

सीमैप ने साईं इण्टरनेशनल को हस्तांतरित की हर्बल हैंड सैनिटाइजर बनाने की तकनीक

लखनऊ (एसएनबी)। केंद्रीय औषधीय एवं सगंध पौधा संस्थान (सीमैप) ने संस्थान द्वारा सुगंधित पौधों से बनाए गए अल्कोहल आधारित हर्बल हैंडसैनिटाइजर 'हेंकूल' बनाने की तकनीक वृंदावन को मेसर्स साईं इण्टरनेशनल, लखनऊ को हस्तांतरित की।

सीमैप के निदेशक डा. प्रबोध कुमार त्रिवेदी ने बताया कि सैनिटाइजर की बढ़ती मांग को देखते हुए अल्कोहल- आधारित हर्बल हैंड सेनिटाइजर 'हेंकूल' विकसित किया है। यह हर्बल सैनिटाइजर खुशबूदार एवं त्वरित रूप से प्रभावी है, जो रोगाणुओं के व्यापक स्पेक्ट्रम के खिलाफ प्रभावी पाया गया है। यह उत्पाद सुगंधित पौधों से

उन्होंने बताया कि हैंड सैनि



प्रयास ● सीएसआईआर–नीरी का उपक्रम, प्रवासी ले रहे हैं रुचि

श्रमिक सीख रहे मृदा-जल संरक्षण के गुर

विभिन्न शहरों के प्रवासी श्रमिकों के रुकने के लिए मनपा ने 21 शेल्टर होम तैयार किए हैं. इसमें 1200 के करीब प्रवासी रुके हुए हैं. वे अपने घर वापस जाना चाहते हैं. काम नहीं होने से मनोवैज्ञानिक असर उन पर पड़ रहा है. निराशा बढ़ रही है.

इसे दूर करने के लिए श्रमिकों में सृजनात्मकता व रचनात्मकता लाने

शेल्टर होम में श्रमिकों को मृदा-जल संरक्षण के गुर सिखा रहे प्रशिक्षक.

हैं. उनके अंदर का तनाव व थकान दूर करने में मदद मिली है. प्रशिक्षण कार्यक्रम को इस तरीके से तैयार किया गया है कि जब प्रवासी श्रमिक शेल्टर होम से बाहर निकलेंगे तो यहां हासिल अतिरिक्त कौशल से उन्हें जीवनयापन में मदद मिलेगी. जिला विधि सेवा प्राधिकरण नागपुर के सचिव व न्यायाधीश अभिजीत देशमुख ने नीरी के उपक्रम की सराहना की.

CSIR Media Coverage

CSIR-IICT gets two more APIs for anti-viral drugs

About 25 drugs identified for 'repurposing' for quick deployment in treatment

V. GEETANATH
HYDERABAD

Council for Scientific & Industrial Research (CSIR) - Institute of Chemical Technology (IICT) has completed the process of making two more Active Pharma Ingredients (APIs) for anti-viral drugs - Umifenovir and Remdesivir. It had already handed over anti-viral Favipiravir API to a large pharmaceutical firm

Indian Institute of Chemical Technology in the city.

CSIR had identified about 25 drugs for 'repurposing' for quick deployment in treatment for COVID-19 since new drugs take at leas 10-15 years to reach the ma

la cl c t r

सीमैप ने तैयार किया खुशबूदार हर्बल सेनिटाइजर, साई इंटरनेशनल करेगा उत्पादन

लखनऊ, 27 मई (हि.स.)। केंद्रीय औषधीय एवं सगंध पौधा संस्थान (सीएसआईआर-सीमैप) लखनऊ ने सैनिटाइजर के लिए बढ़ती मांग के मद्देनजर अल्कोहल-आधारित हर्बल हैंड सेनिटाइज़र 'हेंकूल' विकसित किया है । यह हर्बल सैनिटाइज़र खुशबूदार एवं त्वरित रूप से प्रभावी है, जो कि रोगाणुओं के व्यापक स्पेक्ट्रम के खिलाफ प्रभावी पाया गया है। यह उत्पाद सुगंधित पौधों से बनाया गया है। बुधवार को संस्थान ने तकनीकी को मेसर्स साई इंटरनेशनल को हस्तानांतरित कर दिया। अब यह कम्पनी बड़े मात्रा में उत्पाद शुरु करेगी। डॉक्टर प्रबोध के त्रिवेदी, निदेशक, सीएसआई- - सीमैप ने कहा कि हर्बल हैंड सैनिटाइजर का वैज्ञानिक परीक्षण किया है और इसे रोगाणुओं के व्यापक स्पेक्ट्रम के खिलाफ अत्यधिक प्रभावी पाया गया है। परीक्षण अध्ययनों में यह हर्बल सैनिटाइज़र बाजार में मौजूदा समान उत्पादों से अधिक प्रभावी पाया गया। उन्होंने बताया कि हैंड सेनीटाइजर बनाने की तकनीकी को मेसर्स साई इंटरनेशनल, लखनऊ को हस्तांतरित कर दिया गया है। समझौता ज्ञापन पर हस्ताक्षर भास्कर ज्योति देउरी, प्रशासन नियंत्रक, सीएसआईआर-सीमैप और विनय शुक्ला, मेसर्स साई इंटरनेशनल, लखनऊ द्वारा आज किया गया। संस्था जल्द ही अपनी निर्माण सुविधा में आने वाले महीने में उपरोक्त उत्पाद का उत्पादन शुरू करेगी ।इस अवसर पर डॉ. आर. के. श्रीवास्तव,विभागाध्यक्ष, व्यापार विकास विभाग, डॉ. पूजा खरे, डॉ. राम सुरेश शर्मी, डॉ. चन्दन सिंह चनोतिया एवं सुधा अग्रवाल आदि भी उपस्थित थे।

11:00 ... 66%

Industry, research bodies ...
thehindubusinessline.com
TWEET

THE HINDU BusinessLine

Alkali Manufacturers Association of India (AMAI), National Chemical Laboratory, Pune(CSIR-NCL) and the Mumbai-based Institute of Chemical Technology (ICT) have come together to spread awareness on the safe use of disinfectants that is at the center of the on-going fight against COVID-19.

There have been many instances of disinfection chambers being erected in the country which spray a mist of disinfectants on those passing through the chamber which could do more harm than good, the organizations said in a joint statement.

CSIR, Reliance team up for COVID-19 detection test

27 May 2020 | News

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RT-LAMP is a rapid, accurate and cost-effective test and car be done with indigenous components and set up with minimal expertise and instrumentation

CSIR-IIIM
Reliance Industries Limited

As part of COVID-19 mitigation mission of Country, CSI strategized its R&D to develop, integrate, scale-up deploy necessary technological interventions for com Coronavirus pandemic in the country. Considerin multifarious problems created by coronavirus, require interventions, the CSIR under the guidance Director General, Dr. Shekhar Mande has forme verticals to coordinate various research activiti Digital and Molecular Surveillance, Drugs & Vaccine and Economical Diagnostics, Hospital Assistive De

हेंकूल की तकनीक हस्तांतरित की

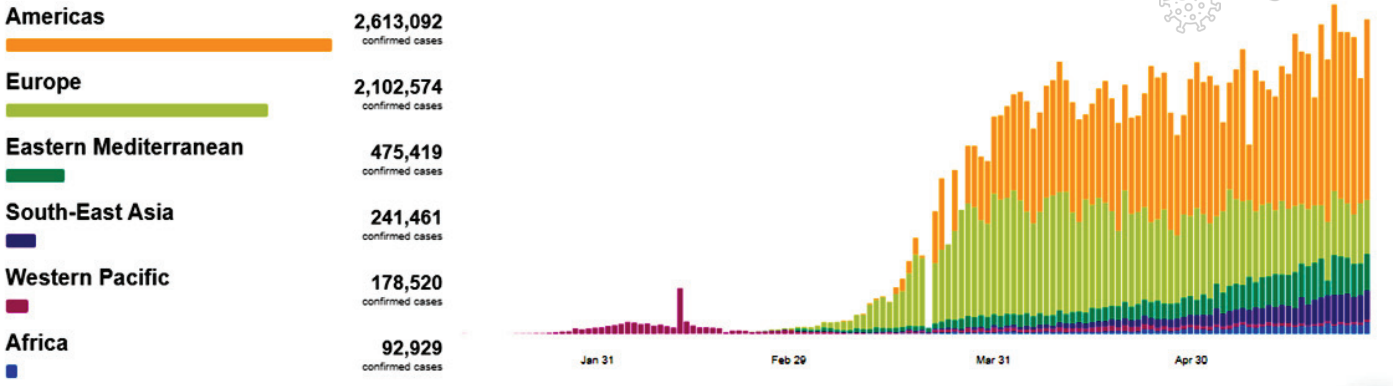
लखनऊ। सीमैप ने बुधवार को अल्कोहल आधारित हर्बल हैंड सैनिटाइजर 'हेंकूल' के बनाने की तकनीक शहर की एक निजी फर्म को हस्तांतरित की है। संस्थान के निदेशक डॉ. प्रबोध के त्रिवेदी की उपस्थिति में समझौता ज्ञापन पर भास्कर ज्योति देउरी, प्रशासन नियंत्रक, सीमैप व विनय शुक्ला, मेसर्स साई इंटरनेशनल ने हस्ताक्षर किए। निदेशक डॉ. प्रबोध ने बताया कि जल्द ही इसका उत्पादन होगा।

COVID-19 Dashboard

COVID-19 Cases and Deaths in India

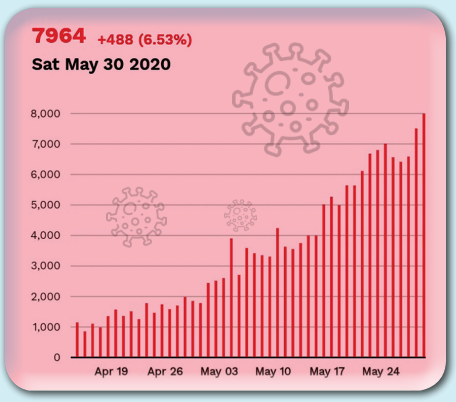
(Data as of 2 June 2020)

	India	Worldwide
Total Confirmed Cases	165799	5701337
New Cases	7466	107740
Total Death	4706	357688
Total New Death	175	4354

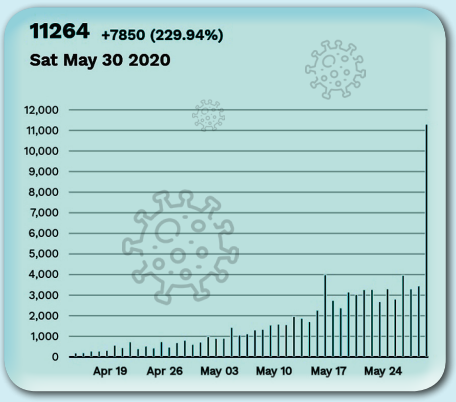


Graph
India

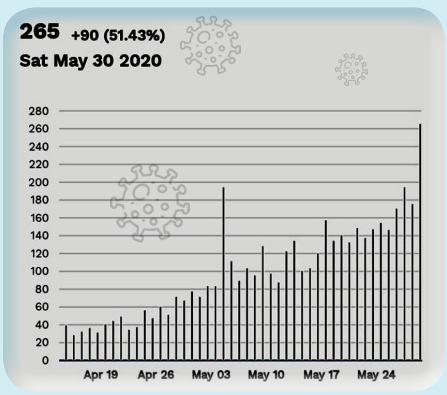
Confirmed Cases



Recovered Cases



Deceased Cases



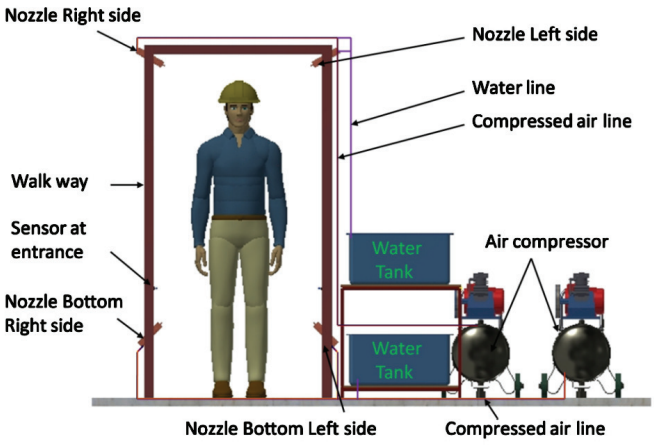
Source: *Aarogya Setu App*

CORONA Q&A

How does disinfection tunnel work?

A disinfection tunnel has an integrated, hydraulic system for the atomisation of any biocides and virucides. The tunnel contains atomised liquid spray to effectively saturate the environment. In this way it is possible to disinfect all surfaces even those that are not directly exposed to the nozzles.

The tunnel creates an obligatory passage and is equipped with internal arc-shaped atomising nozzles that saturate the environment and prevent dispersion. The nebulisation system is connected to a control system capable of automatically mixing the sanitising product at percentages indicated by the manufacturer. Access to the tunnel is regulated by a traffic light with motion detection. By placing a barrier floor inside the Sanitary Gate, it is possible to sanitise the surface in contact with the ground.



Sanitary and decontamination Tunnels and Gates represent a safe protection and entry for everyone, in particular for those who work in close contact with groups and are therefore at higher risk. It can be installed at the entrance of public offices, pharmacies, supermarkets, airports, hospitals, ports, stations. It is suitable for all private companies who need to sanitise the workforce, goods, vehicles and materials.

Could the virus be transmitted from humans to food animals or vice versa?

Currently, there is no evidence to suggest that food animals could be a possible route for transmission of COVID-19 to humans or that food animals can become infected by humans. Studies are underway to better understand the susceptibility of different animal species to the COVID-19 virus and to assess infection dynamics in susceptible animal species.

www.who.int

When does a COVID-19 patient need a ventilator?

At present, there is no prescribed treatment and vaccine available for COVID-19 infection. Patients suffering from COVID-19 infection have fever, cough, nasal congestion, and problem in breathing, etc.

Due to non-availability of medication, infected patients need a support system to stay alive. They need to be given oxygen and ventilator support for breathing as COVID-19 attacks the respiratory system.

However, not all the COVID-19 infected patients need ventilators. The Indian Council of Medical Research (ICMR) estimated that in India only 5% of the COVID-19 patients will require intensive care and half of those will need mechanical ventilation *via* ventilator.

A patient needs mechanical ventilation when the infection of COVID-19 becomes severe and the patient can't breathe naturally. In this emergency situation, the patient needs mechanical ventilation through the ventilator. When the patient can't inhale oxygen and exhale carbon dioxide naturally, a ventilator machine does this for the patient artificially.

When does a person need to be tested for COVID-19?

Not all viral infections related to coughing and sneezing are related to COVID-19. A person needs to be tested for COVID-19 if he/she is showing symptoms of COVD-19 infection *i.e.* fever, cough and acute respiratory illness. As per ICMR, the following groups are given priority in testing:

- hospitalised patients with acute respiratory illness;
- symptomatic healthcare staff working with COVID-19 patients;
- patients with acute respiratory infections with other acute medical conditions such as lung disease, cancer, heart failure, cerebrovascular disease, renal disease, liver disease, diabetes, and immunocompromising conditions.

Should pregnant women be tested for COVID-19?

Testing protocols and eligibility vary depending on where you live. However, WHO recommendations are that pregnant women with symptoms of COVID-19 should be prioritized for testing. If they have COVID-19, they may need specialized care.

www.who.int

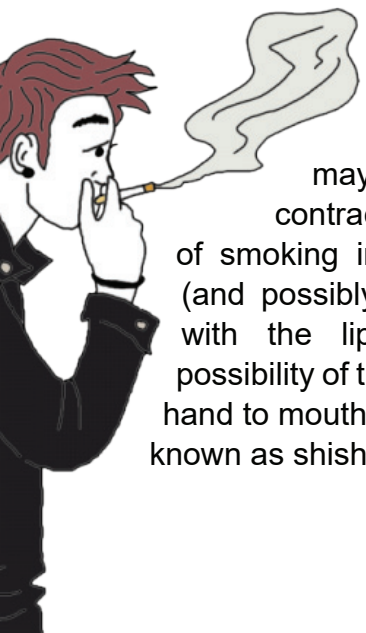
If a mother confirmed or suspected to have COVID-19 does not have a medical face mask should she still breastfeed?

Breastfeeding unquestionably reduces mortality in newborns and infants and provides numerous lifelong health and brain development advantages to the child. Mothers with symptoms of COVID-19 are advised to wear a medical mask, but even if this is not possible, breastfeeding should be continued. Mothers should follow other infection prevention measures, such as washing hands, cleaning surfaces, sneezing or coughing into a tissue. Non-medical masks (e.g. home-made or cloth masks) have not been evaluated. At this time, it is not possible to make a recommendation for or against their use.

www.who.int

As a smoker, is my risk of getting COVID-19 virus higher than that of a non-smoker?

There are no peer-reviewed studies that have evaluated the risk of SARS-CoV-2 infection associated with smoking. However, tobacco smokers (cigarettes, waterpipes, bidis, cigars, heated tobacco products) may be more vulnerable to contracting COVID-19, as the act of smoking involves contact of fingers (and possibly contaminated cigarettes) with the lips, which increases the possibility of transmission of viruses from hand to mouth. Smoking waterpipes, also known as shisha or hookah, often involves the sharing of mouth pieces and hoses, which could facilitate the transmission of the COVID-19 virus in communal and social settings.



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Which surface disinfectants are effective against COVID-19 in non-health care setting environments?

In non-health care settings, sodium hypochlorite (bleach/chlorine) may be used at a recommended concentration of 0.1% or 1,000ppm (1 part of 5% strength household bleach to 49 parts of water). Alcohol at 70-90% can also be used for surface disinfection. Surfaces must be cleaned with water and soap or a detergent first to remove dirt, followed by disinfection. Cleaning should always start from the least soiled (cleanest) area to the most soiled (dirtiest) area in order to not spread the dirt to areas that are less soiled. All disinfectant solutions should be stored in opaque containers, in a well-ventilated, covered area that is not exposed to direct sunlight and ideally should be freshly prepared every day. In indoor spaces, routine application of disinfectants to surfaces via spraying is not recommended for COVID-19. If disinfectants are to be applied, these should be via a cloth or wipe which is soaked in the disinfectant.

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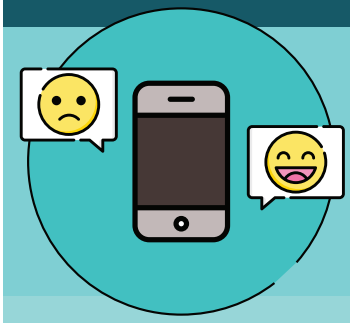
World Health Organization

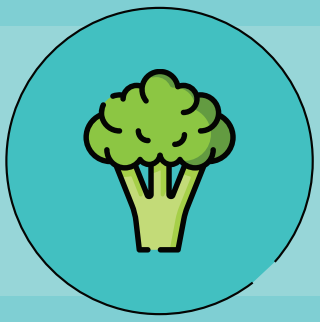
Coping with stress during the 2019-nCoV outbreak



It is normal to feel sad, stressed, confused, scared or angry during a crisis.

Talking to people you trust can help. Contact your friends and family.

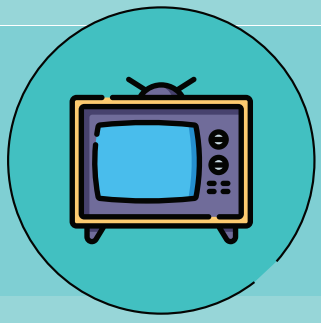
If you must stay at home, maintain a healthy lifestyle - including proper diet, sleep, exercise and social contacts with loved ones at home and by email and phone with other family and friends.



Don't use smoking, alcohol or other drugs to deal with your emotions.

If you feel overwhelmed, talk to a health worker or counsellor. Have a plan, where to go to and how to seek help for physical and mental health needs if required.

Get the facts. Gather information that will help you accurately determine your risk so that you can take reasonable precautions. Find a credible source you can trust such as WHO website or, a local or state public health agency.



Limit worry and agitation by lessening the time you and your family spend watching or listening to media coverage that you perceive as upsetting.

Draw on skills you have used in the past that have helped you to manage previous life's adversities and use those skills to help you manage your emotions during the challenging time of this outbreak.

World Health Organization

Helping children cope with stress during the 2019-nCoV outbreak

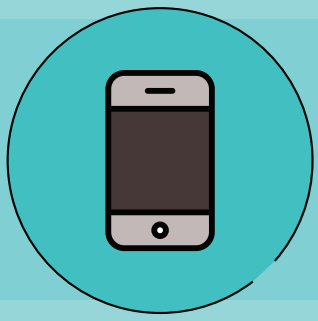
Children may respond to stress in different ways such as being more clingy, anxious, withdrawing, angry or agitated, bedwetting etc.

Respond to your child's reactions in a supportive way, listen to their concerns and give them extra love and attention.

Children need adults' love and attention during difficult times. Give them extra time and attention.

Remember to listen to your children, speak kindly and reasure them.

If possible, make opportunities for the child to play and relax.



Try and keep children close to their parents and family and avoid separating children and their caregivers to the extent possible. If separation occurs (e.g. hospitalization) ensure regular contact (e.g. via phone) and re-assurance.

Keep to regular routines and schedules as much as possible, or help create new ones in a new environment, including school/learning as well as time for safely playing and relaxing.

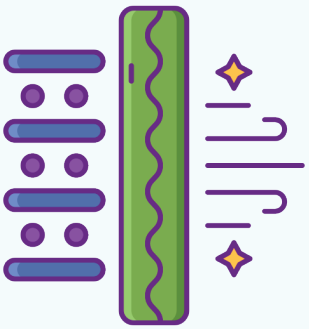
Provide facts about what has happened, explain what is going on now and give them clear information about how to reduce their risk of being infected by the disease in words that they can understand depending on their age.

This also includes providing information about what could happen in a re-assuring way (e.g. a family member and/or the child may start not feeling well and may have to go to the hospital for some time so doctors can help them feel better).

COVID-19 MYTH BUSTERS

MYTH ✗

Air purifiers can protect you from the novel coronavirus



FACT ✓

Air purifiers with a HEPA filter can separate the novel coronavirus from the air. But, their overall protective effect is unclear. Air purifiers only circulate and filter a small amount of air at a time. Thus, infectious droplet released by a patient can still settle down and contaminate surfaces in a room, making air purifiers ineffective at preventing virus transmission.

www.indscicov.in

Drinking hot tea protects against the novel coronavirus

Hot liquids like tea can provide temporary relief from symptoms of cold & throat infections. But the brief and small increase in temperature is not enough to destroy viruses infecting the nasal passage or lungs. There is no evidence to show that compounds in tea leaves can destroy viruses in the body.

www.indscicov.in

Rinsing hands, mouth and nasal passage with coconut oil dissolves the virus coat and prevents infection

No, coconut oil cannot break down the protective coat of virus, and so cannot destroy them. Only chemically modified fats, like the ones found in soap, are able to destroy the virus.

www.indscicov.in

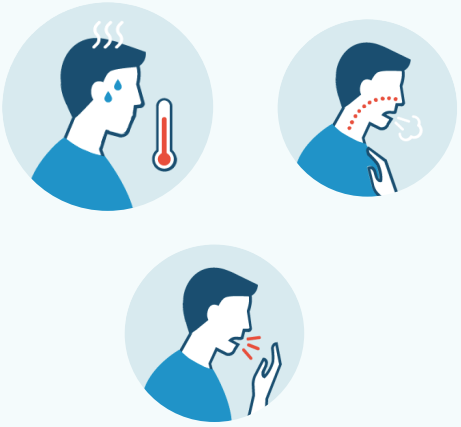
Spraying bleach on someone who might be infected destroys the novel coronavirus

No, spraying bleach cannot destroy the coronavirus inside the body of infected people. Bleach can be used to disinfect surfaces. However, since it is generally at high concentrations it can irritate the eyes, throat and skin.

www.indscicov.in

MYTH ✗

If you have coronavirus, "you'll know"



FACT ✓

No, you won't. COVID-19 causes a wide range of symptoms, many of which appear in other respiratory illnesses such as the flu and the common cold. Specifically, common symptoms of COVID-19 include fever, cough and difficulty breathing, and rarer symptoms include dizziness, nausea, vomiting and a runny nose. In severe cases, the disease can progress into a serious pneumonia-like illness — but early on, infected people may show no symptoms at all.

www.livescience.com

Consuming Kalonji seeds which are rich in hydroxychloroquine will prevent COVID-19

Kalonji seeds are not rich in hydroxychloroquine, and have not been shown to protect against COVID-19. They are instead rich in unrelated compounds called thymoquinone.

www.indscicov.in

You should wipe down all your food from the grocery store to prevent the spread of infection

Currently, there are no reports of people contracting COVID-19 from food or packaging from grocery stores. You can wipe down packing and allow to air dry as a precaution, but it is not recommended that you wipe down non-packaged food you will ingest with chemical cleaners. To prevent the spread of infection, it's best to regularly clean your kitchen, sanitize kitchen counters, and clean produce before eating.

www.intermountainhealthcare.org

There is risk of disease transmission from clothing exposed during work

While there have been no documented cases of transmission of COVID-19 via clothing and shoes at this point, following proper personal protective equipment guidelines at work and cleaning and disinfecting clothes properly is essential for preventing disease transmission.

www.intermountainhealthcare.org

MYTH

Steam inhalation or nasal rinses can cure novel coronavirus infection

FACT

There is no evidence to show nasal rinses or steam inhalation can cure novel coronavirus infection, although they can potentially provide relief from some of the symptoms. These methods do not kill viruses and hence should not be used as a cure.

www.intermountainhealthcare.org

It's dangerous to go outside during the pandemic

The general advice from experts is to stay home as much as possible to limit your risk of a coronavirus infection, but that doesn't mean you can't garden in your yard or take a walk around the neighborhood for some fresh air and exercise. Just make sure you continue to practice precautions — bring some hand sanitizer with at least 60 percent alcohol and keep a distance of at least 6 feet from others. It's important to steer clear of crowded parks and group gatherings. And don't forget to wear a cloth face mask when you do go out.

www.intermountainhealthcare.org

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