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NEWS ALERT

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CORONAVIRUS PANDEMIC

Railways Develops Low-Cost Ventilator 'Jeevan'

The Indian Railways has developed a low-cost ventilator, Jeevan, at its Kapurthala Rail Coach Factory (RCF) that could save thousands of lives at a time when the country is grappling with a shortage of medical equipment in its fight against coronavirus. The Railways said that the prototype is awaiting ICMR clearance to go into production. It will cost around Rs 10,000 without the compressor. The heart of the device is the compressed air container to work the Ambu bag with air without any moving parts like servo motor or piston or link mechanism. It has a microprocessor-based controller and the circuit has been designed by the RCF team. A valve has been installed to regulate breathing of the patient and the device can be optimized to a more compact size. The machine provides control on breathing rate, expiratory ratio, and tidal volume – all key parameters for any ventilator and has a microprocessor-based controlling system.

Govt Launches App 'AarogyaSetu' to Assess, Alert People about Coronavirus Patient

The government on 2 April launched a mobile app to help people assess the risk of catching coronavirus infection themselves and alert authorities if they have come in close contact with a person infected with the deadly virus. The app will detect only fresh cases and will send out alerts to only those who have been near the infected person. The App called Aarogya Setu (https://play.google.com/store/apps/details?id=nic.goi.aarogyasetu&hl=en_IN) joins Digital India for the health and well being of every Indian. It will assess the risk of catching the coronavirus infection based on their interaction with others, using cutting edge bluetooth technology, algorithms and artificial intelligence. If a person is clinically tested positive with coronavirus infection, the mobile number of the infected person is included in the register maintained by the health ministry and will be updated on the app as well. Once installed in a smartphone through an easy and user-friendly process, the app detects other devices with AarogyaSetu installed that come in the proximity of that phone. The app can then calculate the risk of infection based on sophisticated parameters if any of these contacts are tested positive. The App will help the government take necessary timely steps for assessing the risk of spread of COVID-19 infection, and ensuring isolation where required. The government said that privacy is priority for the app users and the personal data collected by the app is encrypted and will stay secure on the phone till it is needed for facilitating medical intervention. Available in 11 languages, the App is ready for pan-India use from day-1 and has highly scalable architecture.

JNCASR develops versatile coating to stop spread of Influenza and COVID 19

An antimicrobial coating, developed by Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore has shown excellent results in tackling the spread of deadly influenza virus, the root cause of severe respiratory infections, by inactivating large loads of influenza virus. The proven efficiency of the coating in 100% destruction of influenza virus (an enveloped virus) shows that the coating may be effective in destroying COVID 19 – another enveloped virus upon contact. The technology which is simple and does not require skilled personnel for its development is already set to be tested against COVID-19. If found to be active, a number of PPEs, such as masks, gowns, gloves, face shields, used by doctors and nurses can be coated with it, imparting enhanced protection and safety to them. The compound that the scientists have synthesized for the coating is soluble in a range of solvents such as water, ethanol, methanol and chloroform. Aqueous or organic solutions of this compound can be used to coat numerous daily-use and medically important materials, such as textiles, plastic, PVC, polyurethane, polystyrene, in a single step. The coating displays excellent antiviral activity against influenza virus completely killing them within 30 minutes of contact. It disrupts the membranes of pathogens (i.e. bacteria) leading to their death. During the research, the coated surfaces also completely killed different drug-resistant bacteria and fungi such as methicillin resistant S. aureus (MRSA)

and fluconazole resistant *C. albicans* spp, respectively, most of them within 30 to 45 minutes, thus displaying rapid microbicidal activity.

DST funded startup develops silver based disinfectant to fight COVID-19

Weinnovate Biosolutions, a Pune based startup supported jointly by the Department of Science and Technology (DST) and Department of Biotechnology (DBT), has come up with a non-alcoholic aqueous-based Colloidal Silver solution uniquely made from its NanoAgCide technology for disinfecting hands and environmental surfaces. This liquid is nonflammable and free of hazardous chemicals and can be an effective sanitizer to prevent the spread of the infection through contact – the prime method of transmission of the pandemic, thereby protecting health professionals and other infected people. The solution has undergone lab testing, and the manufacturers have received the test license. Preliminary work on synthesizing colloidal silver in a small scale and scale-up batch upto 5 liters has been conducted with reproducibility. Silver nanoparticles have been found to be an effective antiviral which act against many deadly viruses like HIV, Hepatitis B, Herpes simplex virus, Influenza virus, and so on. Recent reports have suggested the role of Glutathione capped-Ag₂S NCs (Silver nanoclusters) in inhibiting the proliferation of Coronavirus by preventing the synthesis of viral RNA and viral budding. Colloidal silver technology of the sanitizers of Weinnovate Biosolutions can help arrest COVID-19 spread by preventing the RNA replication and infectivity by blocking the surface glycoproteins. An Indian patent has been filed for the process of making of colloidal silver, and a test license for making hand sanitizers and disinfectants has been granted.

DST sets up rapid response centre at SINE, IIT Bombay to combat COVID-19

Department of Science & Technology, Government of India has approved setting up of a Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH) at a total cost of Rs 560 million to scout, evaluate and support the innovations and start-ups that address COVID-19 challenges. The Society for Innovation and Entrepreneurship (SINE), a technology business incubator at IIT Bombay supported by DST has been identified as the Implementing Agency of the CAWACH. The CAWACH's mandate will be to extend timely support to potential startups by way of the requisite financial assistance and fund deployment targeting innovations that are deployable in the market within next 6 months. CAWACH will identify upto 50 innovations and startups that are in the area of novel, low cost, safe and effective ventilators, respiratory aids, protective gears, novel solutions for sanitizers, disinfectants, diagnostics, therapeutics, informatics and any effective interventions to control COVID-19. It will provide access to pan India networks for testing, trial and market deployment of these products and solutions in the identified areas of COVID-19 priorities. This will help to address various challenges faced by country due to severe impact of Covid-19.

DST-SERB announces first set of approved projects to combat CoVID-19

The Department of Science and Technology - Science and Engineering Board (DST-SERB) announced several calls for special research projects to urgently ramp up national R&D efforts against the Covid-19 pandemic. The first set of 5 projects has been selected by DST-SERB, which will be supported for further development into implementable technologies. Three of these projects concern the highly important issue of antiviral and virustatic surface coating of inanimate surfaces, such as personal protection equipment (PPE); while another one deals with the identification of metabolite biomarkers in CoVID-19 infected patients enabling therapeutic target identification; and the last one concerns with the development of antibodies against the receptor-binding domain of the spike glycoprotein of coronavirus.

SCTIMST ties up with Wipro 3D to manufacture automated ventilators

Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) has tied up with Wipro 3D, Bengaluru to jointly build a prototype of an emergency ventilator system based on Artificial Manual Breathing Unit (AMBU), developed by SCTIMST followed by its clinical trial and manufacture. Sree Chitra's Automated AMBU Ventilator with inputs from clinical faculty will assist the breathing of the critical patients who have no access to ICU ventilators. This portable and lightweight device enables positive pressure ventilation with a controlled rate of expiration, Inspiratory to Expiratory Ratio, Tidal Volume, and so on. Also, A PEEP (Positive End Expiratory Pressure) Valve can be added as an extra component to maintain pressure on the lower airways at the end of the breathing cycle, which prevents the alveoli from collapsing during expiration. The compressed gas source can also be attached to the system. The automatic device will minimize the need of support personnel in the isolation room, thereby enabling a safer and effective lung-protective operation to COVID patients.

DST supports startup developing rapid test-kit for detection of COVID-19

The Department of Science & Technology has funded 'Module Innovations', a Pune based healthcare start-up working on care diagnostics to build up technology for rapid diagnosis of diseases and develop a product for detecting COVID-19 with a 10 to 15 minutes test. Using the proven concept from its flagship product USense, Module is now developing nCoVSENSEs (TM) which is a rapid test device for detection of antibodies that have been generated against COVID-19 in the human body. With the rapid test device, it will be possible to confirm infection in patients and also determine whether an infected patient has recovered and also identify the stage of infection in the patients. The nCoVSENSE test is aimed at detecting the IgG and IgM antibodies generated in the human body upon the onset of viral infection and is targeted against the Spike proteins making it specific for COVID-19. The startup is planning to deploy the test within 2-3 months after due validation with national agencies. This in future will also help determine people who have recovered and

front line jobs could be assigned to them. The test could also be used to screen patients and passengers at airports, railway stations, hospitals and many such settings thus safeguarding us for any future outbreak as well. While the feasibility of the technology has been proved, the Proof of concept (PoC) and Prototype illustrating functionality of product are to be demonstrated.

2500 Coaches converted as Isolation Coaches by Railways

In order to supplement the national efforts in combating COVID-19, Indian Railways has, in a short span of time, converted 2500 coaches thereby making 40000 isolation beds available for contingency. After prototype was approved, conversion action was started quickly by Zonal Railways. On an average, 375 coaches are being converted by Indian Railways in a day. The work is being carried out at 133 locations in the country. These coaches are equipped as per the issued medical advisories. Efforts are being made to ensure best possible stay and medical supervision as per the needs and norms. These isolation coaches are being prepared only as a contingency and to supplement the efforts of the Ministry of Health in fighting the COVID-19.

IIT Roorkee Develops Unique Surveillance System to Tackle COVID-19

In an endeavor to augment government efforts for surveillance of COVID suspects, IIT Roorkee, has developed a unique tracking mobile application which is endowed with state of-the-art features. The app can track individuals and also can do geo-fencing around him. The system will get an alert, if geofencing is violated by the quarantined person. In case GPS data is not received, the location will be obtained automatically through the triangulation of mobile towers. If the internet is not working in a certain area, the location will be received through SMS. If the application gets off, an alert will be received immediately. The location of the person can be received by sending an SMS to the device. It allows the sharing of quarantined persons/places photographs on a google map, uploading geotag image to a server. Furthermore, administrators can view all reports on a map. If installed on the affected person, it can provide a history of all people in his vicinity for a defined period. The surveillance system is a plug and play device and allows tracking with an accuracy of +/- 5 meters through notifications at 2, 10 or 20 seconds. Other features of the app include multi-camera support, surveillance magnetic device, halt time and auto camera click on preset time.

Indian Startup to make natural, alcohol-free sanitizer to combat COVID 19

Green Pyramid Biotech (GPB), a company working on Food, Agriculture, and Bio-Technology, located in Pune, Maharashtra, is being funded by the Department of Science & Technology (DST), for manufacturing natural, alcohol-free sanitizer for hands and surfaces with long-lasting antibacterial and antiviral effect. Since the disease spreads through contagion, cleaning of hands, as well as commonly used surfaces like tables, computers,

chair, mobile phones, and locks, is very essential to slow down the spread. The use of soap or alcohol can destroy the thin outer layer of fat that covers the virus, but ready availability of soap and water is a challenge. The access and regulation of usage of the alcohol-water mixture are difficult too. This sanitizer formulation developed by Green Pyramid Biotech, whose Active Pharmaceutical Ingredient (API) is a biosurfactant that provides long-lasting protection against bacteria and viruses, can be an alternative to significantly reduce the risk of infection. It has been tested against a wide array of pathogenic bacteria, fungi, and yeast. The formulation can provide a convenient and effective way to clean hands and surfaces and is totally biodegradable, natural, and alcohol-free.

Disinfection Walkway and Road Sanitizer Unit to fight COVID 19

CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur has developed technologies which can be deployed at multiple critical locations such as Isolation/Quarantine facilities, Mass Transit System Entry points, Medical Centres and any other location with a considerable amount of footfall. The Pneumatic Disinfection Walkway deploys Six Bar pressure Air Compressor to ensure optimum mist formation. The embedded sensors of the Walkway ensure that the operational time of the system can be varied within a range of 20 seconds to 40 seconds. Though the initial cost of this variant is relatively higher, the operating cost of this system is much less, owing to optimum usage of disinfectant in this system. This has been installed at CMERI and the dimensions of the Walkway at the CMERI Institute Main Gate are 2 metre height by 2.1 metre length and 1 metre width. The Hydraulic Variant Disinfection Walkway deploys 1 hp pressurised motor High Velocity pump with necessary set up nozzles to ensure optimum mist formation. The CSIR-CMERI Road Sanitizer Unit is a tractor-mounted Road Sanitizing System. This Road Sanitization unit can be effectively deployed in long stretches of highways, vicinity of toll plazas etc, where there is a massive volume of traffic and higher chances of infection spreading. It can also be deployed in Housing Complexes, Office Complexes, Sports Arenas, Apartment buildings, etc.

India allocates Rs. 150 billion for COVID-19 Response and Preparedness

Government of India (GoI) has announced significant investments to the tune of Rs.150 billion for 'India COVID-19 Emergency Response and Health System Preparedness Package'. The funds sanctioned will be utilized for immediate COVID-19 Emergency Response (amount of Rs.78 billion) and rest for medium-term support (1-4 years) to be provided under mission mode approach. The key objectives of the package include mounting emergency response to slow and limit COVID-19 in India through the development of diagnostics and COVID-19 dedicated treatment facilities, centralized procurement of essential medical equipment and drugs required for treatment of infected patients, strengthen and build resilient National and State health systems to support prevention and preparedness for future disease outbreaks, setting up of laboratories and

bolster surveillance activities, bio-security preparedness, pandemic research and proactively engage communities and conduct risk communication activities. These initiatives would be implemented under the Ministry of Health and Family Welfare. The major share of the expenditure will be used for mounting robust emergency response, strengthening National and State health systems followed by strengthening pandemic research and multi-sector national institutions and platforms for one health, community engagement and risk communication, etc.

Chandigarh University designs splitters that can bridge ventilators shortfall in India

A ventilator helps the patients breathe by artificially pumping oxygen through their windpipe. According to a WHO report, India has only 48,000 ventilators and as cases tick up in India, ventilators, which are in a short supply, is the biggest worry. To help the healthcare sector, the University Centre for Research and Development (UCRD) at Chandigarh University has designed two-way, three-way and four-way ventilator splitters with the help of 3D Printing Technology which can help in quadrupling the ventilator capacity of hospitals in the quickest possible time. Polylactic Acid also known as Polylactide (PLA) is used for manufacturing the two-way, three-way and four-way ventilator splitters, which is one of the biodegradable and biocompatible thermoplastics derived from renewable sources such as corn starch, tapioca roots and sugarcane. A splitter can distribute oxygen to four patients from one ventilator as they usually run at 20-30 percent capacity as they can push 2,000 ml of oxygen per minute into the lungs which mean that each ventilator can provide enough oxygen for four people.

Efforts underway to produce therapeutic antibodies against Covid-19

Although COVID-19 has resulted in many deaths, a large number of infected people are also recovering despite not having any specific treatment. This is because of antibodies produced within the body in response to the virus invasion. Over the years, passive transfer of antibodies obtained from the plasma of convalescent patients cured of infection has been used for treatment of numerous disease conditions such as Diphtheria, Tetanus, Rabies, and Ebola. Today, such therapeutic antibodies can be produced in the laboratory by DNA-based recombinant technologies. Efforts are in full swing globally to produce therapeutic antibodies against SARS-CoV-2. In India, the University of Delhi research group is isolating genes encoding antibodies, which can neutralise the SARS-CoV-2, using a large antibody library already available in-house as well as a library made from cells of patients who have recovered from COVID-19 infection. These antibody genes will be used to produce recombinant antibodies in the laboratory, which, if successful in neutralising the virus, will become a perennial source of antibodies against this virus, both for prophylactic and therapeutic purposes.

Indian innovators are fighting corona with drones and robots

From low cost portable ventilators to drones for sanitising, robots for delivery of food and medicines to special stethoscope for examining patients from a distance and a UV technology fitted trunk for sanitising currency and grocery items, several institutions and start ups have come up with innovations to strengthen the fight against COVID-19 pandemic. Various mobile applications including "GoCoronaGo" to "Sampark-o-Meter" for contact tracing, calculating risk of coming in contact with a COVID-19 infected person and tracking by authorities if a person has violated quarantine, have also been developed by IITs and Indian Institute of Science (IISc), Bangalore. The Indian Institute of Technology (IIT) Guwahati has taken the lead in development of various drones to aid the fight. One group has developed drones for disinfection of larger areas, while another group has come up with drone equipped with infrared camera which can help in thermal screening of groups without human intervention and identify suspected COVID-19 cases at an early stage once the lockdown is lifted. The drone also has a loudspeaker which can be used by personnel to monitor places especially with high disease prevalence and give appropriate instructions.

India in final stages of framing protocols for clinical trial of plasma therapy

According to Indian Council of Medical Research (ICMR), India is in the final stages of framing a protocol for conducting a clinical trial for convalescent plasma therapy, which uses antibodies from the blood of cured patients, to treat severely-ill Covid-19 patients. Kerala is set to become the first state in the country to commence the therapy to treat those critically-ill on a trial basis. The ICMR is learnt to have given its nod to the state government for the first-of-its-kind project, initiated by the prestigious Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST). The ICMR official on Thursday said that they would need approval from Drug Controller General of India (DCGI) before embarking on any clinical trial using the therapy and initially, it will be used only in clinical trials.

CSIR-NCL innovates Digital IR Thermometer, OEU to assist in coronavirus mitigation

The Council of Scientific and Industrial Research (CSIR) and National Chemical Laboratory (NCL) announced two important innovations namely, Digital IR Thermometer and oxygen enrichment unit, that can help in the mitigation of the coronavirus outbreak. The CSIR-NCL's Venture Centre's incubatee BMEK has developed a handheld digital IR thermometer, which is an important component of measures to mitigate COVID-19. The design of IR thermometers is freely available to manufacturers across India and would enable them to manufacture the thermometers and cater to their local demands. Now it is being scaled up in partnership with Bharat Electronics Limited, Pune and about 100 prototype units will be made for pilot distribution and testing at TUV Rheinland India Private Limited, Bangalore. The second innovation is the oxygen enrichment unit (OEU)

prototype, which will be sent to TUV for testing/validation. About 10 OEU machines will be assembled by NCL and BEL in Pune and after the trials; scale-up will be done.

Indian scientists wage frontline battle against coronavirus

As the second largest populous country in the world grapples with lockdown, its scientific community is working hard to find interdisciplinary solutions to deal with novel coronavirus pandemic. From predicting statistical trends and making mathematical models to developing rapid paper-based test kits and low-cost ventilators, the Indian S&T community has leveraged its strengths against the epidemic. The S&T ecosystem is working extensively to close last-mile gaps in commercialising their technologies. Given the scarcity of COVID-19 testing kits, scientists at the CSIR-Institute of Genomics and Integrative Biology (IGIB) have devised a paper strip-based testing assay that can detect the viral RNA of the novel coronavirus SARS-Cov-2 within an hour. The paper-strip test uses the cutting edge CRISPR-Cas9 technology and the kit would cost less than Rs.500. The institute is also developing a 'sample to sequence' strategy, where test samples can be diagnosed by next generation sequencing (NGS). Another group of virologists at the National Institute of Virology in Pune is focussing its energies on how the virus interacts with its host, which will give better knowledge to supplement studies by drug development groups. According to researchers at Translational Health Science and Technology Institute (THSTI) boosting public health research to help control the spread is the first priority followed by developing additional diagnostic tools, drugs and vaccines. Beyond the R&D efforts in government laboratories, technologists are also devising interesting ways to arrest the spread of the virus through efforts like 'Corona Kavach' app and other similar applications.

BCG Vaccination statistically correlated with lower mortality from COVID-19

Researchers from Johns Hopkins University have analysed the correlation between Bacille Calmette Guérin (BCG) vaccine and COVID-19-attributable mortality per 1 million population after adjusting factors such as country economic status (GDP per capita), and proportion of elderly among the population, and aligning the time since the 100th reported case. COVID-19-attributable mortality among BCG-using countries was 5.8 times lower than in non BCG-using countries. This finding is purely based on statistical data and the underlying reasons for it and the mechanism if any through which BCG confers protection against COVID-19 are not yet clear. The researchers recommend urgently mobilizing resources for prospective randomized interventional studies and institution of systematic disease surveillance, particularly in low and medium income countries.

Novacyt's Two-Hour Coronavirus Test Gains FDA Emergency Use Approval

Novacyt S.A. (Paris, France), a specialist in clinical diagnostics, has secured Emergency Use Authorization from FDA for its fast and easily transportable COVID-19 test which was developed by Primerdesign, its molecular diagnostics division. Novacyt's real-time

polymerase chain reaction (PCR) COVID-2019 IVD-CE test detects viral genetic material, RNA, collected through a swab test of the nose or throat. The RNA is isolated from the sample and detected using qPCR, which amplifies genetic material. As compared to RNA detection methods used for confirming the virus in patients that takes up to four hours to deliver results and require specialized equipment, Novacyt's test only detects the SARS-CoV-2 virus and produces results in less than two hours. The company freeze-dries its kit reagents to ensure easy transport and storage, making its test suitable for tropical climates and low-resource settings. Novacyt has signed a global distribution agreement for its COVID-19 test with Bruker-Hain Diagnostics. Additionally, Novacyt has signed an agreement for certain contract manufacturing services with Yourgene Health Plc (Camberley, UK).

Coalition to accelerate COVID-19 research in low-and middle-income countries

A group of scientists, physicians, funders, and policy makers from over 70 institutions across 30 countries have launched an international coalition to respond to COVID-19 in resource-poor settings. The COVID-19 Clinical Research Coalition aims to accelerate desperately needed COVID-19 research in those areas where the virus could wreak havoc on already-fragile health systems and cause the greatest health impact on vulnerable populations. One important research response to COVID-19 has been launched already; the World Health Organization (WHO)-led SOLIDARITY trial is an unprecedented global effort. But the authors found that out of almost 600 COVID-19 clinical trials registered, very few trials are planned in resource-poor settings. The authors commit to sharing their technical expertise and clinical trial capability to accelerate COVID-19 research in these settings. The coalition will facilitate a coordinated approach, so that all data from all regions can be collected in a similar fashion, pooled and shared in real-time. This will help countries and WHO to make rapid evidence-based decisions on policies and practice.

COVID-19 vaccine candidate shows promise

The scientists at the School of Medicine, University of Pittsburgh announced a potential vaccine against SARS-CoV-2, the new coronavirus causing the COVID-19 pandemic. When tested on mice, the vaccine, delivered through a fingertip-sized patch, produced antibodies specific to SARS-CoV-2 at quantities thought to be sufficient for neutralizing the virus. The team used previous experience on SARS-CoV in 2003 and MERS-CoV in 2014. The vaccine called PittCoVacc, short for Pittsburgh Coronavirus Vaccine follows an established approach, using lab-made pieces of viral protein to build immunity similar to the way the current flu shots work. The researchers also used a novel approach to deliver the drug, called a microneedle array, to increase potency. This array is a fingertip-sized patch of 400 tiny needles that delivers the spike protein pieces into the skin, where the immune reaction is strongest. The patch goes on like a Band-Aid and then the needles -- which are made entirely of sugar and the protein pieces -- simply dissolve into the skin. The system

also is highly scalable. Purifying the protein also can be done at industrial scale. Mass-producing the micro-needle array involves spinning down the protein-sugar mixture into a mould using a centrifuge. The team is applying for an investigational new drug approval from the U.S. Food and Drug Administration in anticipation of starting a phase I human clinical trial in the next few months.

Trial drug significantly block early stages of COVID-19 in engineered human tissues

An international team led by University of British Columbia has found a trial drug that effectively blocks the cellular door SARS-CoV-2 uses to infect its hosts. ACE2 - a protein on the surface of the cell membrane - is the key receptor for the spike glycoprotein of SARS-CoV-2. The team found that a drug - called APN01 (human recombinant soluble angiotensin-converting enzyme 2 - hrsACE2) - soon to be tested in clinical trials by the European biotech company Apeiron Biologics, is useful as an antiviral therapy for COVID-19. In cell cultures hrsACE2 inhibited the coronavirus load by a factor of 1,000-5,000. In engineered replicas of human blood vessel and kidneys - organoids grown from human stem cells - the researchers found that hrsACE2 also reduced the SARS-CoV-2 infection. Using organoids, allows testing in a very agile way which is already being used in treatment for other diseases, or that are close to being validated. Tests in human organoids can save considerable time in drug development.

Possible drug identified: Ivermectin stops SARS-CoV-2 virus in cell culture

A collaborative study led by the Monash Biomedicine Discovery Institute (BDI) with the Peter Doherty Institute of Infection and Immunity (Doherty Institute), a joint venture of the University of Melbourne and Royal Melbourne Hospital, has shown that an anti-parasitic drug already available around the world kills the virus within 48 hours. The scientists showed that the drug, Ivermectin, stopped the SARS-CoV-2 virus growing in cell culture within 48 hours. Even a single dose could essentially remove all viral RNA by 48 hours and significantly reduce it even within 24 hours. Ivermectin is an FDA-approved anti-parasitic drug that has been effective in-vitro against a broad range of viruses including HIV, Dengue, Influenza and Zika virus. Although the mechanism by which Ivermectin works on the virus is not known, it is likely, based on its action on other viruses, that it stops the virus 'dampening down' the host cells' ability to clear it. The use of Ivermectin to combat COVID-19 would depend on the results of further pre-clinical testing and ultimately clinical trials, with funding urgently required for progress of the work.

Experimental Drug Has Broad Spectrum Antiviral Activity against Coronaviruses

Researchers from University of North Carolina at Chapel Hill have found that a drug called EIDD-2801 has broad spectrum antiviral activity against SARS-CoV-2, MERS-CoV, SARS-CoV, and related zoonotic coronaviruses in primary human airway epithelial cells.

They also found that, when used as a prophylactic, EIDD-2801 can prevent severe lung injury in infected mice. EIDD-2801 is an orally available form of the antiviral compound EIDD-1931 (β -D-N4-hydroxycytidine). It can be taken as a pill and can be properly absorbed to travel to the lungs. When given as a treatment 12 or 24 hours after infection has begun, EIDD-2801 can reduce the degree of lung damage and weight loss in mice. This window of opportunity is expected to be longer in humans, because the period between coronavirus disease onset and death is generally extended in humans compared to mice. This new drug not only has high potential for treating COVID-19 patients, but also appears effective for the treatment of other serious coronavirus infections. Compared with other potential COVID-19 treatments that must be administered intravenously, EIDD-2801 can be delivered by mouth as a pill. In the new study, the researchers demonstrated that viruses that show resistance to remdesivir experience higher inhibition from EIDD-1931. Clinical studies of EIDD-2801 in humans are expected to begin shortly. If they are successful, the drug could not only be used to limit the spread of SARS-CoV-2, but also could control future outbreaks of other emerging coronaviruses.

[EU announces second wave of research response to COVID-19](#)

European research ministers this week backed a fresh round of rapid response research initiatives to fight COVID-19, including a plan to increase capacity for testing of experimental vaccines, an all-Europe hackathon competition, and a new research task force to share ideas around member states more quickly. The plan aims to make better use of resources across the continent, by freeing up computing power in big science infrastructures for COVID-19 research. The EU member states had also given their provisional support to extra investments for the Coalition for Epidemic Preparedness Innovations (CEPI), an international body that is investing in eight vaccine candidates. The group aims to raise €2 billion to continue its operations, but member states did not yet announce any new funding commitments. Meanwhile, the COVID-19 hackathon, scheduled to run from 24-26 April, researchers will chew over some of the biggest problems still facing governments in the corona fight, including how to rapidly make new medical equipment and scale up production. The EU has so far spent up to €137.5 million in funding for R&D projects working on diagnostics, treatments and vaccines and another €164 million for start-ups and SMEs with innovative solutions to tackle the outbreak.

GLOBAL

[Revolutionary light-emitting silicon breakthrough paves the way for photonic chips](#)

Researchers from Eindhoven University of Technology have developed an alloy with silicon that can emit light. The team will now start creating a silicon laser to be integrated into current chips. Together with researchers from the universities of Jena, Linz and Munich, they combined silicon and germanium in a hexagonal structure that is able to emit light. The

team managed to increase the quality of the hexagonal silicon-germanium shells by reducing the number of impurities and crystal defects. The experiments showed that the material has the right structure, and that it is free of defects. It emits light very efficiently, realizing optical properties which are almost comparable to indium phosphide and gallium arsenide, and the materials quality is steeply improving, making it possible to create a silicon-based laser in 2020. This would enable prospects for on-chip optical communication and affordable chemical sensors based on spectroscopy.

[AI helps identify biodiversity hotspots in the high seas](#)

Ocean scientists and high seas experts from 13 universities and institutions gathered in a series of workshops held at UC Santa Barbara and have developed a standardized, data-driven strategy to identify hotspots of biodiversity potentially deserving of protection in the high seas. They used big data and an optimization algorithm to try to balance the benefits of protecting certain locations with high biodiversity against costs, such as the loss of fishing in that area. Their aim was to find win-win solutions for the possible placement of these high seas protected areas. Each hotspot identified in this analysis was special for its own unique reasons. For example, the Costa Rica Dome, a dynamic nutrient rich region that attracts endangered blue whales and leatherback sea turtles; the Emperor Seamount Chain, a string of extinct underwater volcanoes that are home to some of the oldest living corals; and the Mascarene Plateau, an area in the Indian Ocean that has the largest contiguous seagrass meadow in the world and provides habitat for many globally unique species. These and other notable biodiversity hotspots across the globe could constitute the critical mass needed to achieve long-term marine sustainability goals, according to the research, and are worthy of consideration as the first generation of high seas marine protected areas. Preliminary results from this exercise were presented by UC Santa Barbara scientists at the United Nations during the third negotiation session for the proposed high seas treaty in August 2019.

INDIA

[India ships hydroxychloroquine tablets to 13 countries](#)

Indian Government has approved the first list of countries that will receive COVID-fighting drugs from India, including the anti-malaria drug, hydroxychloroquine or HCQ. The first consignment has started to leave. The list includes 13 countries including the United States of America, Spain, Germany, Bahrain, Brazil, Nepal, Bhutan, Afghanistan, Maldives, Bangladesh, Seychelles, Mauritius and the Dominican Republic. India will require 10 million tablets for domestic use and current stock stands at over 32.8 million. The United States had asked for 4.8 million HCQ tablets. India has approved 3.6 million tablets along with 9 Metric Tonnes active pharmaceutical ingredient (API), as per their request. Besides USA, it is only Brazil, Canada and Germany that are expected to get 5 million HCQ tablets each in the second consignment. In the first consignment, Brazil will receive 0.53 MT API and

Germany, 1.5 MT API. Among neighbouring countries, Bangladesh will get 2 million HCQ tablets, Nepal - 1 million, Bhutan - 0.2 million, Sri Lanka - 1 million (not in first consignment), Afghanistan - 0.5 million and Maldives - 0.2 million. India will also be exporting a total of 430 million paracetamol tablets. The list of countries slated to receive paracetamol from India includes - UK, South Africa, Australia, New Zealand and a few African nations.

Bharat Petroleum Develops Novel Technology to Test Crude Oil Quality

The country's second largest national oil marketer Bharat Petroleum Corp Ltd has developed a novel technology to test the quality of crude oil at a fraction of the cost and time that it takes now through the lengthy lab tests. The technology, which has a number of patents including those from the US and the EU, is a 'crude horoscope predictor tool' called BPMarrk, which can optimise varied properties from the crude. The traditional way of assaying takes 30-45 days for a complete testing and the cost averages at Rs 25 lakh. But the BPMarrk takes around 30 minutes for a four-stage test at a fraction of the present cost. BPMarrk can predict around 500 properties of any crude oil using four parameters and can help generate the output within an hour compared to the other conventional processes which require three to four weeks of laboratory testing. BPMarrk can also enable oil suppliers, international trades and supply-chain optimisation for advanced planning, crude selection and also for process engineers for unit-level optimisation of refinery operations.

IN BRIEF

Researchers develop a tiny unit that is both an optical transmitter and a receiver

Researchers at Linköping University, together with colleagues in China, have developed a tiny unit that is both an optical transmitter and a receiver. The device is a diode that can be directed in two directions: it can receive optical signals and it can just as easily transmit them. This means that text and photographs can be wirelessly transmitted from one unit to the other and back again, using two identical units so rapidly as happening in real time. This tiny unit that can both receive and transmit optical signals provides a unique opportunity to simplify and shrink the functionality of the current optical systems, in particular given that it can also be integrated with traditional electronic circuits.

A novel Li-ion superionic conductor makes possible an era of safe battery

A research team, from the Center for Energy Materials Research at the Korea Institute of Science and Technology (KIST), has successfully developed a sulfide-based superionic conductor that can be used to a high-performance solid electrolyte in all-solid-state batteries. This new material which has a sulfide-based crystalline structure called argyrodite (a mineral with composition Ag_8GeS_6) delivers the Li-ion conductivity of 10.2 mS/cm at room temperature and is comparable to that of liquid electrolytes used for typical Li-ion

batteries. The research team has also reported a new synthesis technology that can reduce the processing time of existing synthesis technologies by more than one third. It is expected that this technology will greatly accelerate the mass production of superionic solid electrolyte materials and contribute to the commercialization of all-solid-state batteries.

RESOURCES AND EVENTS

[UN meetings rescheduled due to Covid-19](#)

In view of the prevailing situation of Covid-19, UN General Assembly meetings scheduled for the months of April and May have been postponed in the wake of the “rapidly evolving” coronavirus pandemic. But, there are no plans as yet to change the dates of the high-level annual UNGA session in September. The Fourth Session of the Intergovernmental Conference on an international legally binding instrument under the UN Convention of the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ), which was scheduled to take place in New York from 23 March to 3 April, has been postponed “to the earliest possible date to be decided by the General Assembly.” Other meetings postponed or cancelled include the Multi-stakeholder Forum on Science, Technology and Innovation (STI Forum), New York, 12-13 May.

[COP-26 postponed to November 2021](#)

The Bureau of the Conference of the Parties (COP) to the UN Framework Convention on Climate Change (UNFCCC), together with leaders from the UK and Italy, announced that the 26th meeting of the COP (COP-26) will take place in 2021, rather than November 2020. The decision was taken due to the COVID-19 pandemic, which makes it “ambitious” to hold COP in November this year, with 20,000 participants. COP 26 is still expected to be hosted by UK at in partnership with Italy. UK announced that the dates for the rescheduled conference “will be set out in due course following further discussion with parties”. The Pre-COP and ‘Youth for the Climate’ event that was to take place in Italy, has been postponed at the same time.

Editor’s note:

From this issue onwards, a new section has been added covering developments related to the global Coronavirus (Covid-19) pandemic and the Science and Technology related efforts under way to deal with the situation.

We welcome your comments and valuable suggestions. Please write to us for receiving publications, updates and notices regarding seminars, conferences etc.



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