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NEWS ALERT

Forum for Indian Science Diplomacy

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GLOBAL

New technology makes tumour eliminate itself

Scientists at the University of Zurich have developed a technology called SHREAD (Shielded, Retargetted Adenovirus) to direct adenoviruses to deliver genes for cancer therapeutics into tumour cells. The delivered genes then serve as a blueprint for therapeutic antibodies, cytokines and other signaling substances, which are produced by the cancer cells themselves to eliminate tumours from the inside out. The scientists used the SHREAD system to make the tumour cells to produce a clinically approved breast cancer antibody, called trastuzumab, in the mammary of a mouse. They found that, after a few days, SHREAD produced more of the antibody in the tumour than when the drug was injected directly. Using high-resolution 3D imaging, they also visualised how the therapeutic antibody, produced in the body creates pores in blood vessels of the tumour and destroys tumour cells. This technology can be used for the delivery of a wide range of protein-based drugs and is also being used to allow targeted production of COVID-19 antibody therapies in lung cells.

Singapore scientists turn aquaculture waste into new biomaterial for tissue repair

Scientists at Nanyang Technological University (NTU), Singapore have developed a new biomaterial made entirely from discarded bullfrog skin and fish scales that could help in bone repair. The porous biomaterial, which contains the same compounds that are predominant in bones, acts as a scaffold for bone-forming cells to adhere to and multiply, leading to the formation of new bone.The team found that human bone-forming cells seeded onto the biomaterial scaffold successfully attached themselves and started multiplying - a sign of growth. They also found that the risk of the biomaterial triggering an inflammatory response is low. Such a scaffold could be used to help with the regeneration of bone tissue lost to disease or injury, such as jaw defects from trauma or cancer surgery. It could also assist bone growth around surgical implants such as dental implants. More than 20 million tonnes of fishery by-products, such as fins, scales, and skins, are discarded every year. The research team has filed patents for the biomaterial's wound healing and bone tissue engineering applications.

New diagnostic tool predicts the risk of Alzheimer's with accuracy of 90 percent

Scientists in Sweden have developed a simple and reliable tool for diagnosing Alzheimer's disease in its earliest stages. The prototype analyzes the results of a single blood test and three cognitive exams, which take only ten minutes to complete. With just that information, the new algorithm was able to predict with 90 percent certainty which patients with mild cognitive impairment would go on to develop Alzheimer's within four years. These blood plasma samples were used to look for a known Alzheimer's risk gene as well as evidence of tau protein tangles in those already suffering from mild memory problems. The researchers hope that their test - after additional improvements and tweaking - will one day make a major difference in the diagnosis of Alzheimer's, especially in places that can't afford expensive brain imaging technology or cerebrospinal fluid tests.

An Aerogel for therapeutic use

Researchers at the KTH Royal Institute of Technology in Stockholm have developed an aerogel made from natural ingredients, including plant cellulose and algae, ideal for a wide range of uses, including the timed release of medication and wound dressing.The aerogel's density could be pushed down to as low as 2kg per cubic meter.The process for nanocellulose-based aerogels involves dispersing nanofibrils in water, and then drying out the mixture.The team mixed cellulose nanofibrils (CNF) in water with alginate, a naturally occurring polymer in seaweed and then added calcium carbonate. In the freezer, the water turns to ice and compresses these components together, rendering a frozen hydrogel.The frozen hydrogel is removed from the freezer and placed in acetone, which not only removes water and evaporates quickly, but by adding a bit of acid to the acetone, it dissolves the calcium carbonate particles and releases CO2, generating the bubbles that could make the material more porous. The dissolution of calcium carbonate enables yet another benefit: it releases calcium ions which crosslink with the alginate and CNFs, giving the aerogel wet-stability and its ability to recover its shape after being suffused with liquid.

COVID-19

COVID-19 (WORLD)

A novel defense mechanism for SARS-CoV-2 discovered

Scientists from Hokkaido University have discovered a novel defensive response to SARS-CoV-2 that involves the viral pattern recognition receptor RIG-I. Using RIG-I mutants, the scientists were able to elucidate the mechanisms by which RIG-I suppressed SARS-CoV-2 replication. The helicase domain, a structural element in RIG-I, interacts with the viral RNA, blocking a virus-derived enzyme responsible for replication. The study has also indicated that RIG-I expression levels are one of the

potential parameters for the prediction of COVID-19 patient outcomes. Further work would be done to uncover factors or conditions that modulate RIG-I expression levels, and may lead to new strategies to control SARS-CoV-2 infection.

A rapid antigen test for SARS-CoV-2 in saliva

Scientists from Hokkaido University have developed an antigen-based test for quantifying SARS-CoV-2 in saliva samples which is simple, rapid, and more conducive for mass-screening. The novel SARS-CoV-2 antigen based kit- Lumipulse, is based on chemiluminescent enzyme immunoassay (CLEIA). It can rapidly detect SARS-CoV-2 with good accuracy in test samples. Test results showed that CLEIA is reliable and correlates well with RT-PCR. CLEIA alone can be used to detect SARS-CoV-2 within an hour; however, using CLEIA for screening and RT-PCR for confirmation increases the accuracy of diagnosis. Saliva samples are easy to collect quickly by the individuals being tested, reducing the risk for healthcare workers. Furthermore, self-collection of saliva allows multiple samples to be collected simultaneously for expeditious screening of visitors at large gatherings. Combined CLEIA and RT-PCR testing on saliva samples has already been implemented at Japanese airport quarantines.

A new rapid test detects a coronavirus infection in 10 minutes

Researchers at the University of Helsinki have developed a new rapid assay principle for viral antigen detection to diagnose SARS-CoV-2 infections. The test uses time-resolved Förster resonance energy transfer (TR-FRET), where energy travels between two light-sensitive molecules when they are close enough to each other. A nasopharyngeal swab is mixed in a test solution which contains antibodies that recognise the SARS-CoV-2 nucleoprotein or spike protein. The antibodies marked with fluorescent labels bind with SARS-CoV-2 particles, forming molecular assemblies, or complexes, whose existence can be confirmed/detected by using a TR-FRET assay. The results come in roughly 10 minutes and false positives are much lower than PCR tests. A TR-FRET reader roughly the size of a desktop computer is needed for the test, which is easy to carry almost anywhere and could manually analyse as many as 500 samples per hour. Also, the cost of test reagents is fairly low. The assay principle can be utilised to detect other respiratory infections or basically any molecule with antibody capable of identifying the target molecule.

New testing platform for COVID-19

A new microchip real-time technology platform that uses 10-fold less reagents compared to Centers for Disease Control and Prevention (CDC) approved tube-based RT-PCR tests have been validated by researchers from Canada. The kit contains microchips with 30 microwells preloaded with SARS-CoV-2 primers and probes. Real-time qPCR was performed using 1.2 microliter reaction volume per reaction on a microchip-based PCR analyzer to obtain PCR results. It delivered results in 30 minutes and accuracy was 100 percent predictive in clinical samples. These preliminary results demonstrate a promising, versatile technology that can be easily configured and mobilized to detect infections and may enable point-of-care testing in remote locations, clinics, and airports.

Ultrafast, on-chip PCR could speed diagnosis

South Korean researchers have developed a plasmofluidic chip that can perform PCR in only about 8 minutes, which could speed diagnosis during current and future pandemics. They devised a postage-stamp-sized polydimethylsiloxane chip with a microchamber array for the PCR reactions. When a drop of sample is added to the chip, a vacuum pulls the liquid into the microchambers, which are positioned above glass nanopillars with gold nanoislands. Any microbubbles, which could interfere with the PCR reaction, diffuse out through an air-permeable wall. When a white LED is turned on beneath the chip, the gold nanoislands on the nanopillars quickly convert light to heat, and then

rapidly cool when the light is switched off. The researchers tested the device on a piece of DNA containing a SARS-CoV-2 gene, accomplishing 40 heating and cooling cycles and fluorescence detection in only 5 minutes, with an additional 3 minutes for sample loading. The new device could provide many opportunities for rapid point-of-care diagnostics during a pandemic.

Immunity to SARS-CoV-2 may persist for years

Researchers at Washington University in St. Louis have identified long-lived antibody-producing cells in the bone marrow of people who have recovered from COVID-19. The team analyzed blood from 77 people who recovered from mild cases of COVID-19 at three-month intervals. Antibody levels in these individuals dropped rapidly four months after infection, but this decline slowed. The researchers could still detect antibodies that recognized the SARS-CoV-2 spike protein up to eleven months after infection. The team obtained bone marrow samples from 19 people roughly seven months after they had been infected, of which fifteen had detectable memory B cells, which indicates that immunity triggered by SARS-CoV-2 infection may be long-lasting. The team has also observed early signs that Pfizer's mRNA vaccine should trigger the production of the same cells.

COVID-19 (INDIA)

Ventilation system for PPE suits developed

An innovative technology called 'Covtech Ventilation System' which is a compact, portable, and user-friendly device to provide a ventilation system for PPE suits, has been developed by a Pune based startup company. The device can be fastened over the waist like a simple belt over which the traditional PPE is worn. The design of the ventilation system ensures a complete air seal from the PPE kit and provides a breeze of fresh air to the user in a gap of just 100 seconds. This system can keep the health workers' well ventilated, preventing not only bodily discomforts but also possible fungal diseases in the body. The Covtech Ventilation system is already being used in two hospitals in Pune and the company plans to scale up the uses by May/June.

Bleeding and clotting events following COVID-19 vaccination minuscule in India

An urgent in-depth analysis of the adverse events (AE) post-vaccination in India in the light of the global concerns concerning the AstraZeneca-Oxford vaccine (Covishield in India) was conducted. The report submitted by the National Adverse Event Following Immunization (AEFI) Committee to the Ministry of Health & Family Welfare stated that bleeding and clotting cases following COVID vaccination in India were minuscule and in line with the expected number of diagnoses of these conditions in the country. The AEFI Committee has completed an in-depth case review of 498 serious and severe events, of which 26 cases have been reported to be potential thromboembolic events following the administration of Covishield vaccine, with a reporting rate of 0.61 cases/ million doses. There were no potential thromboembolic events reported following administration of the Covaxin vaccine.

Affordable Rapid Antigen test kit developed

A Department of Science and Technology supported startup company has developed an affordable Rapid Antigen Test for COVID- 19 diagnosis at the cost of Rs.100 per test. The test kit has been validated in COVID-19 patients and Viral Transport Medium samples containing nasopharyngeal swabs of COVID patients. The test gives results in about 10 to 15 minutes and would be helpful for early diagnosis of COVID-19 in rural areas, doctor's clinics, and resource-constrained areas where pathology and diagnostic labs are not available. Licenses for the product have been applied for, and the startup plans to launch it in early June, 2021.

New multiplex RT-PCR kit to detect various mutant strains of COVID-19

A new multiplex RT-PCR kit developed at Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) has novel gene targets to facilitate detection across various mutant strains of COVID-19 with higher accuracy. The kit targets two SARS-CoV-2 genes: RdRp and ORFb-nsp14, and the human RNAse P gene as the internal control to help detect a range of mutant strains. It is based on multiplex Taqman chemistry, to amplify all three genes in a single reaction and the amplification time for the assay is 45 minutes. The two highly accurate confirmatory genes like RdRp and ORF-nsp14 used in the kit gives precise results and currently, there are no kits in the market with ORF-nsp14 as the target. The kit has been validated by ICMR and found to have 97.3 percent sensitivity and 100 percent specificity in COVID-19 detection. SCTIMST has signed a non-exclusive license MoU with Huwel Lifesciences, Hyderabad, on 14th May 2021, to commercialize the kit.

Electrochemical ELISA test for rapid and accurate estimation of total antibody concentration of COVID-19

A Bangalore-based start-up incubated in the Indian Institute of Science has developed a novel, semi-quantitative Electrochemical ELISA test that enables fast and accurate estimation of total antibody concentration of COVID-19 in clinical samples. The technology is based on the measurement of electrochemical redox activity of IgM and IgG antibodies specific to SARS-CoV-2 Spike Glycoprotein (S1). The S1 protein hosts the Receptor Binding Domain (RBD), which latches to the ACE2 receptors on the cells before infection. Hence the antibody tests targeting S1 spike protein are more representative of an immune response against infection compared to other antibody tests targeting Nucleocapcid (N) protein. This novel technology can detect the COVID-19 antibodies all the way down to nanomolar concentration. This technology is useful in understanding biological responses that depend on the quantity of antibodies, such as the efficacy of vaccines in generating antibodies and vaccine breakthroughs. The technology has been protected through US and Indian patent applications.

DRDO develops antibody detection kit for COVID-19

The Defence Research and Development Organisation has developed a new antibody detection kit, DIPCOVAN that gives result in 75 minutes. DIPCOVAN is intended for the qualitative detection of IgG antibodies in human serum or plasma, targeting SARS-CoV-2 related antigens. It can detect spike as well as nucleocapsid (S&N) proteins of SARS-CoV-2 virus with a high sensitivity of 97 percent and specificity of 99 percent. In May 2021, the product received regulatory approval from the Drugs Controller General of India, Central Drugs Standard Control Organisation to manufacture the product for sale and distribution.

Saline Gargle RT-PCR Testing method developed

Scientists at CSIR-National Environmental Engineering Research Institute (NEERI) have developed a 'Saline Gargle RT-PCR Method' for testing COVID-19 samples. The Saline Gargle RT-PCR method uses a simple collection tube filled with a saline solution where the patient gargles the solution and rinses it inside the tube. The sample in the collection tube is taken to the laboratory where it is kept at room temperature, in a special buffer solution prepared by NEERI. When this solution is heated, an RNA template is produced, which is further processed for RT-PCR. This method saves costly infrastructural requirement of RNA extraction and also minimizes waste generation. This innovative testing technique will be especially beneficial for rural and remote areas where infrastructure requirements are a constraint. The technique has received the approval of the Indian Council of Medical Research and NEERI has further been asked to train other testing labs, to help scale up its adoption across the country.

Disinfection system developed that makes N95 Masks, PPE, medical gear reusable

A Mumbai-based start-up, Indra Water, has developed an N95 Mask/PPE disinfection system which can significantly decrease the cost of combating the pandemic by making PPE, medical, and non-medical gear reusable. This would also reduce the generation of excessive COVID-19 related bio-medical waste. The product uses a multistage disinfection process with advanced oxidation, corona discharge, and UV-C light spectrum to inactivate the viruses, bacteria, and other microbial strains present on the PPE with more than 99.999 percent efficiency.The system has been validated and tested by the Department of Biosciences & Bioengineering at IIT Bombay and has been found to achieve more than 5 LOG (99.999 percent) inactivation of viruses and bacteria. It has also been approved by CSIR - NEERI and IP55 certified. The disinfection system has now been installed at multiple Government hospitals across Maharashtra and Telangana.

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

CSIR-Central Scientific Instruments Organisation (CSIO) has developed a UV-C air duct disinfection system according to the requirements for deactivation of the SARS-CoV-2 virus contained in an aerosol. UV-C deactivates over 99 percent of viruses, bacteria, fungus and other bioaerosols etc. with appropriate dosages using 254nm UV light. The technology could be used as a retrofit solution to Air Handling Units (AHUs) of buildings, transport vehicles and other spin-off applications. The UV-C is an energy-efficient system, improves airflow through coils, enhances indoor air quality, and requires less maintenance cost. It can be fitted into any system having AHU ducts. CSIR-CSIO has transferred the technology to 28 manufacturers for wider availability of the product throughout the country.

INDIA – SCIENCE & TECHNOLOGY

Low-cost magnetometer for real-time measurements of magnetic fields

Scientists from Raman Research Institute (RRI), Bengaluru, have devised a more efficient, faster, and low-cost digital receiver system (DRS) that can make precise measurements of magnetic fields. The hardware of digital receiver systems has been built with standard silicon-based memory devices and computer codes are implemented which make these devices perform mathematical operations on the signal they receive, enabling DRS to measure fundamental properties of matter like ‘Spin’. The spin of electrons determines the magnetism of the objects around. The researchers designed the system to work in two different modes. Their method speeds up the calculations compared to the standard method. They measured a magnetic field of 800 microgauss (roughly a thousand times smaller than the Earth’s magnetic field) within a tenth of a second. For commercialisation of the device, the researchers are open to partner with industry.

Recycling Carbon technology by Indian startup receives award

A Bangalore based startup has received the National Award 2021 from the Technology Development Board (TDB) for developing a commercial solution for conversion of CO2 to chemicals and fuels. Breathe Applied Sciences, a startup incubated at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) developed efficient catalysts and methodologies for the conversion of CO2 to methanol and other chemicals. The startup signed an agreement with JNCASR for the transfer of technology based on lab-scale research on reducing CO2 to methanol and other useful chemicals and fuels. A pilot plant has been set up with a capacity of CO2 conversion of 300 kg per day, which can be scaled up to several 100 tons in an industrial scale.

Machine learning helps pick out stars in a crowd

A team of Astronomers from the Indian Institute of Astrophysics (IIA) have developed a new method based on Machine Learning that can identify cluster stars with greater

certainty. The team used a machine learning technique called Probabilistic Random Forest, which uses a combination of parallax, proper motion, temperature, brightness and other parameters to classify each star as a cluster member or a non-member. The IIA team trained their algorithm using the most likely members from a model called the Gaussian Mixture Model, which can identify clumps of co-moving stars, thereby learning to identify a typical cluster member star and efficiently taking out stars that share only similar proper motions or only similar velocities as the cluster itself. The method has been used to identify hundreds of additional stars for six different clusters up to 18000 light-years away and uncover peculiar stars.

Indian Navy develops Oxygen plant on wheels

Naval Dockyard Visakhapatnam has designed and developed Mobile Oxygen Generation Plants, termed 'Oxygen on Wheels'. The Oxygen Plants, mounted on trailers, can easily be transported to remote hospitals and connected to the hospital's fixed Oxygen piping system to serve as the main feed for up to 16 beds. The Oxygen System can also serve as a backup to prevent incidents of low oxygen pressure in the hospitals. Such a system has been conceived and implemented to support the state government's efforts to deal with oxygen crises, especially in smaller hospitals and rural areas which do not have the requisite infrastructure.

DRDO develops near-Isothermal Forging Technology for aeroengines

Defence Research and Development Organisation (DRDO) has developed a near isothermal forging technology to produce all the five stages of high-pressure compressors (HPC) discs out of difficult-to-deform titanium alloy using its unique 2000 MT isothermal forge press. Bulk quantity (200 numbers) of HPC disc forgings pertaining to various compressor stages have been produced and successfully supplied to HAL (E), Bengaluru for fitment into the Adour Engine that powers the Jaguar/Hawk Aircrafts. The technology was developed by integrating various science and knowledge-based tools. Though the methodology adopted was generic, the compressor discs produced have met all the requirements stipulated by the airworthiness agencies for the desired application. The technology was type certified and a letter of technical approval (LoTA) was accorded. Based on the exhaustive component level and performance evaluation test results, HAL (E) and Indian Air Force cleared the components for engine fitment.

Self-pollinating apple variety developed by Himachal farmer spreads far and wide

A farmer in Himachal Pradesh has developed a self-pollinating apple variety -HRMN 99 that does not require long chilling hours for flowering and fruit setting. From a single plant (mother plant) in the backyard in 1999, the farmer experimented by grafting the young shoot and in four years he created a mini orchard of apple trees which bear fruits even today. The National Innovation Foundation (NIF) verified the claims of the innovator and evaluated the distinctiveness and potentiality of the variety by facilitating molecular and diversity analysis studies and fruit quality testing. NIF also provided financial and technical support for establishing and expanding the nursery, while helping in registration of the variety under the Protection of Plant Variety and Farmers Right Act, 2001. This variety has now spread to plain, tropical and subtropical areas in India, where the summer temperature can range between 40 and 45 degree Celsius. The cultivation of this variety on a commercial scale has started in Jammu, Manipur, low lying areas of Himachal Pradesh, Karnataka, Chhattisgarh and Telangana.

A natural dye extract may protect human eyes from harmful laser radiation

Researchers from the Raman Research Institute (RRI), Bengaluru, and Kensri School and College, Bengaluru have extracted natural indigo dye from Indigofera Tinctoria leaves and studied its optical properties. The dye is found to show excellent nonlinear absorption (in the same range as that of materials such as graphene oxide) which leads

to an excellent optical limiting behavior. It can be used to develop optical limiters for weakening potentially harmful radiation and protecting human eyes and sensitive optical devices from accidental damage in an environment where lasers are in use.

IN BRIEF

A new class of bio-inspired, light-capturing nanomaterialssynthesised

Researchers at Pacific Northwest National Laboratory, along with collaborators from Washington State University have created a novel material that reflects the structural and functional complexity of natural hybrid materials to capture light energy. The material combines the programmability of a protein-like synthetic molecule with the complexity of a silicate-based nanocluster to create a new class of highly robust nanocrystals, programmed to create a highly efficient artificial light-harvesting system. They also found that, under the right conditions, these molecules can be induced to self-assemble into perfectly shaped crystals of 2D nanosheets. The nanocrystals demonstrated unique properties including high programmability which has been used by the researchers for bioimaging. The nanocrystals were inserted into live human cells as a biocompatible probe for live cell imaging.

Scientists develop transparent electrode that boosts solar cell efficiency

An international team has developed new ultrathin metal electrodes to create semitransparent perovskite solar cells that are highly efficient and can be coupled with traditional silicon cells to greatly boost the performance of both devices.The perovskite solar cell that the team developed achieved 19.8 percent efficiency, a record for a semitransparent cell. And when combined with a traditional silicon solar cell, the tandem device achieved 28.3 percent efficiency, up from 23.3 percent from the silicon cell alone. The team found that chromium used as a seed layer allowed gold to form on top in a continuous ultrathin layer with good conductive properties.The solar cells made with the gold electrodes are stable and maintain high efficiencies over time in laboratory tests.

Optimizing body's own immune system to fight cancer

Researchers at the University of Minnesota have engineered immune cells to enable a patient's own immune system to fight tumours. Immunotherapy has been successful for some types of blood cancer but in case of solid tumors, the cytotoxic T cells face barriers to reach the cancer cells. So, the researchers used genome editing to engineer cytotoxic T cells, to change the DNA of the T cells, so that they are better able to overcome the tumour's barriers. The researchers were able to improve the ability of the engineered immune cells to slow down the cancer cells. The engineered cells moved through the tumour almost twice as fast no matter what obstacles were in their way. Presently, engineered immune cells in rodents are being studied. Further the mechanical properties of the cells to better understand how the immune cells and cancer cells interact will be studied. This study allows for a very personalized approach with applications for a wide array of cancers.

New biosensor developed to aid early diagnosis of breast cancer

A team of Spanish researchers have developed a prototype of a new biosensor to help detect breast cancer in its earliest stages using liquid biopsy. The mesoporous biosensor developed by the UPV-INCLIVA team is easy to use, low cost, and provides results in a very short time (between 30 and 60 minutes) from a sample of the patient's plasma. The biosensor is composed of a nanomaterial, a nanoporous alumina that facilitates the detection of miR-99a-5p microRNA (which is associated with breast cancer) in plasma. The nanopores of the biosensor are loaded with a dye, rhodamine B and sealed with an oligonucleotide. When interacting with the plasma sample, if the pore gates do not detect the presence of the microRNA, they remain closed; in contrast, in the presence of

miR-99a-5p, the pore gates open and the dye is released. The change in dye release can be correlated with either healthy or breast cancer patients.

New CRISPR tools help contain mosquito disease transmission

University of California San Diego scientists have developed several genetic editing tools that help pave the way to an eventual gene drive designed to stop Culex mosquitoes from spreading disease. The scientists developed a Culex-specific Cas9/gRNA expression toolkit and used site-directed homology-based transgenesis to generate and validate a Culex quinquefasciatus Cas9-expressing line. The gRNA scaffold variants improved transgenesis efficiency in both Culex and Drosophila (fruit fly) and boosted gene-drive performance in the fruit fly. These findings support future technology development to control Culex mosquitoes and provide valuable insight for improving these tools in other species.

Self-organizing human heart organoids in a dish

A team of researchers in Vienna have used human pluripotent stem cells to grow sesame-seed-sized heart models, called cardioids that spontaneously self-organize to develop a hollow chamber without the need of experimental scaffolds. They coaxed stem cells to self-organize by activating all six known signaling pathways involved in embryonic heart development in a specific order. As the cells differentiated, they started to form separate layers, similar to the structure of the heart wall. After one week of development, these organoids self-organized into a 3D structure that had an enclosed cavity, a similar spontaneous growth trajectory as human hearts. The human heart models that develop more naturally can predict diseases and also help in better understanding of how defects develop in fetuses.

Good bacteria can temper chemotherapy side effects

A new Northwestern University study found that specific types of gut bacteria can protect other good bacteria from cancer treatments mitigating harmful, drug-induced changes to the gut microbiome. The team developed ‘mock gut communities’, which included various types of bacteria typically found in the human gut such as Escherichia coli and Klebsiella pneumoniae that are good at breaking down chemotherapy drug doxorubicin; Clostridium innocuum and Lactobacillus rhamnosus that are especially sensitive to doxorubicin; Enterococcus faecium that is resistant to doxorubicin but does not break it down. The team then exposed these mock gut communities to doxorubicin and found increased survival among sensitive strains. The researchers concluded that by degrading doxorubicin, certain bacteria made the drugs less toxic to the rest of the gut and could temper short and long term side effects of treatment. This research highlights a promising new pathway for potentially protecting cancer patients. However, its translation into treatments is still far away.

A new type of immunosensor for immunoassay tests

Researchers from Tokyo Tech, Japan, have developed a novel immunosensor by adding a modified luciferase enzyme called "NanoLuc" (Nluc) to the quenchbody (Q-body) immunosensor. This novel immunosensor, termed "BRET Q-body", works on the bioluminescence resonance energy transfer (BRET) principle.The substrate reacts with the enzyme and this reaction provides the energy required by the dye to induce fluorescence. The BRET Q-body system can be used to visualize the presence or the absence of an antigen as a change in the emission color without any instrument.This research paves the way forward for a new class of bioluminescent sensors that do not require an external excitation light source and could be a promising tool for diagnosis, food safety, environmental preservation, and biological research.

RESOURCES AND EVENTS

G7 commits to end unabated coal finance in 2021 to help meet 1.5°C target

Following a two-day virtual meeting, climate and environment ministers from the G7 countries agreed to enshrine the tougher goal of limiting global warming to below 1.5°C, the Paris Agreement benchmark for climate action. The ministers agreed to stop investments in unabated coal and committed to an absolute end to new direct government support for unabated international thermal coal power generation by the end of 2021. Ministers also agreed to phase out direct government support for carbon intensive fossil fuel projects overseas except in limited circumstances at the discretion of each country and in a way which would keep 1.5°C within reach. Japan came on board after initial resistance. The move leaves China isolated as the last major funder of coal projects overseas. The International Energy Agency has said that investments in new oil and methane production as well as unabated coal power need to end in 2021 for the global energy sector to reach net zero emissions by 2050.

BRICS meeting on emerging issues in Biotechnology and Biomedicine

More than 60 participants, including researchers, academicians, and government officials participated from all five BRICS countries Brazil, Russia, India, China, and South Africa, participated in the online meeting organized on 25-26 May 2021.They suggested future directions of research collaboration among BRICs countries in areas such as Antimicrobial Resistance, Artificial Intelligence and Digital Health Medicine, Non-Communicable Diseases, Neurological Disorders, Agro-biotechnology, Food and Nutrition, Cancer, long Post-Covid Challenges and Complications including Molecular Pathogenesis of COVID-19 virus. India proposed a BRICS Consortium to address Post COVID challenges, tackling Non-Communicable Diseases as a Flagship Programme. Russia proposed Sustainable Agro-biotechnology for Healthy Food and Nutrition, advanced Virtual Reality assisted technology for neurorehabilitation. China proposed a flagship programme on Cancer research. This meeting is part of the BRICS Science, Technology, and Innovation Calendar of Activities 2020-21.

BRICS countries to enhance collaboration among astronomers

More than 50 participants, including researchers, academicians, and government officials participated in an online meeting of the BRICS Astronomy Working Group, under the Science, Technology, and Innovation track of the BRICS 2021 calendar. The delegates deliberated on strategic and operational matters and recommended networking of existing Telescopes in BRICS countries to create a regional Data Network. The members of the working group also indicated future directions of research in this area such as building a network of intelligent telescope and data network, study of transient astronomical phenomena in universe, big data, artificial intelligence, machine learning application to process the voluminous data generated at present due to enhanced multi-wavelength telescope observations. From the Indian side, the Inter-University Centre for Astronomy and Astrophysics, Pune, and the Department of Science and Technology, Government of India coordinated the meeting

40 top scientists call for better ventilation systems

A group of 40 experts have recommended including pathogen control requirements in air quality standards to combat the spread of airborne pathogens. Ventilation systems should also be demand-controlled to adjust for different room occupancies, and differing activities and breathing rates, such as exercising in a gym versus sitting in a movie theatre.That risk of people becoming cross-infected inside a building can be reduced through ventilation coupled with air disinfection and air filtration systems. This means more efficient and flexible ventilation systems than today. In addition, the

researchers recommended use of monitors displaying the parameters characterizing indoor air quality, which would provide information to the general public. The new standards would likely result in less than 1percent increase in the designing and construction cost of new buildings and enable better health and savings in the healthcare system. Improved indoor air quality increases labour productivity and reduces the 'sick building syndrome' and allergic reactions.

SCIENCE POLICY AND DIPLOMACY

New panel launched on emergence and spread of zoonotic diseases

International organizations have come together to launch a new One Health High-Level Expert Panel to improve understanding of how diseases with the potential to trigger pandemics, emerge and spread. The panel will advise four international organizations - the Food and Agriculture Organization of the United Nations (FAO); the World Organisation for Animal Health (OIE); the United Nations Environment Programme (UNEP); and the World Health Organization (WHO) - on the development of a long-term global plan of action to avert outbreaks of diseases. It will operate under the One Health Approach, which recognizes the links between the health of people, animals, and the environment and highlights the need for specialists in multiple sectors to address any health threats and prevent disruption to agri-food systems. The panel will consider the impact of human activity on the environment and wildlife habitats.The panel will guide development of a dynamic new research agenda and draw up evidence-based recommendations for global, regional, national and local action.

India and Israel sign work program for cooperation in Agriculture

India and Israel have had bilateral relations since 1993 in the agricultural sector.Taking forward this partnership and enhancing their cooperation in agriculture, the two governments have signed a three-year work program agreement, including the “INDO-ISRAEL Agricultural Project Centres of Excellence” and the “INDO-ISRAEL Villages of Excellence” programmes. The Ministry of Agriculture & Farmer’s Welfare, Government of India, and MASHAV - Israel’s Agency for International Development Cooperation are leading 29 operational Centres of Excellence (COEs) across 12 Indian states, which implements Advanced-Intensive agriculture farms with Israeli Agro-Technology, tailored to local conditions. The new work program will aim to grow existing COEs, establish new centers, increase CoE’s value chain, bring the COEs into the self-sufficient mode, and encourage involvement of private sector companies. The “INDO-ISRAEL Villages of Excellence” is a new concept which will focus on modern agricultural infrastructure; capacity building; and market linkage to create a model ecosystem in agriculture across eight states, alongside 13 COEs within 75 villages.

New climate reports predict higher chance of reaching 1.5 °C in next 5 years

The World Meteorological Organization (WMO)'s latest climate update predicts about a 40 percent chance of the annual average global temperature temporarily reaching 1.5°C above the pre-industrial level in at least one of the next five years – and this probability is increasing with time. Over 2021-2025, high-latitude regions and the Sahel are likely to be wetter and there is an increased chance of more tropical cyclones in the Atlantic compared to the recent past (defined as the 1981-2010 average).This study shows that the world is getting measurably and inexorably closer to the lower target of 1.5°C of the Paris Agreement on Climate Change. It is yet another wake-up call that the world needs to fast-track commitments to slash greenhouse gas emissions and achieve carbon neutrality.The chance of temporarily reaching 1.5°C has roughly doubled compared to last year’s predictions. Tackling climate change is high on the agenda of the G-7 Leaders Summit hosted by the United Kingdom from 11-13 June.

Leaders call for concrete commitments to achieve Energy and Climate goals

Leaders from the UN, the private sector, national and local governments, youth and other organizations have called for countries, businesses, cities, and civil society groups to put forward "Energy Compacts" to show how they will contribute to achieving the goal of clean, affordable energy for all by 2030 (SDG 7) and net-zero emissions by 2050. For countries, the Compacts will align with enhanced Nationally Determined Contributions and long-term climate goals under the Paris Agreement. A global roadmap for actions needed to achieve clean, affordable energy for all by 2030 is currently being developed by five Technical Working Groups focusing on the themes of the Dialogue - energy access; energy transition; enabling the SDGs through inclusive, just energy transitions; innovation, technology and data; and finance and investment. The roadmap will be launched at Ministerial Thematic Forums on the same five themes in June.

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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