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BIOTECH EXPRESS

The monthly magazine of Biotechnology

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From the very first issue, Biotech Express team has been delivering what's best for Biosciences community. The audience of this magazine includes students, researchers, faculties and executives of highly prestigious organizations of India. In year 2016, BEM has made new editorial Board combining experience of eminent Advisory Board Members who have been into Award winning Research and head prestigious Administrative positions.

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Editorial in News

Prof Ashok Pandey become the third Indian scientist with h-index more than 100

July 2020 | Dr Seema Pavgi Upadhyay

As per google scholar, scientist who have h-index in the range of 20 are good scientist, 40 are outstanding, 60 are truly amazing but 100 or more are unimaginary, unbelievable etc. Prof Pandey is the only third Indian after Prof CNR Rao and Prof Kayanmoy Deb to achieve this feat.

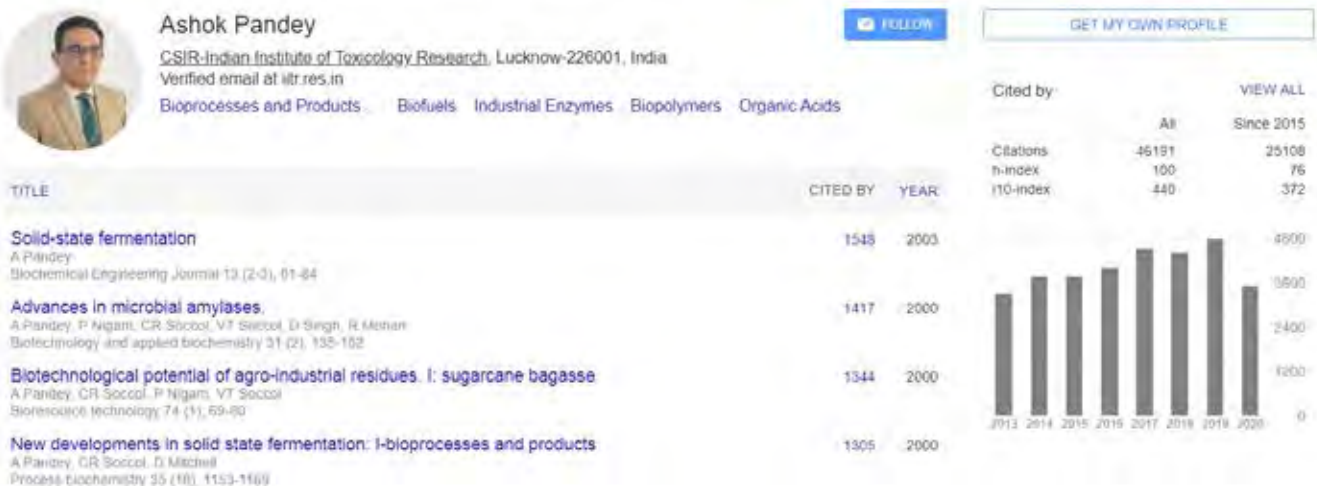


Photo: Google Scholar profile of Prof Ashok Pandey

This year Prof Ashok Pandey is also in the list of unbelievable scientists, according to the Google Scholar Citations public profiles. In the year 2019, the Professor Ashok Pandey was among the top 1% highly cited global researcher from India and only name from CSIR which is largest research organization in the country.

The data for this edition was collected during the last week of April 2020 of a BETA list of the public profiles of the most highly cited researchers (h-index larger than 100) according to their declared presence in the Google Scholar Citations database.

The list, that includes both living and deceased authors, is ranked first by h-index in decreasing order and when ties appear, then by the total number of citations as a secondary criteria.

About Professor Ashok Pandey

Professor Pandey is currently Distinguished Scientist at Centre for Innovation and Translational Research, CSIR-Indian Institute of Toxicology Research (IITR), Lucknow, India and Honorary Executive Director at the Centre for Energy and Environmental Sustainability- India. Formerly, he was Eminent Scientist at the Center of Innovative and Applied Bioprocessing (CIAB), Mohali and Chief Scientist & Head of Biotechnology Division at CSIR's National Institute for Interdisciplinary Science and Technology (NIIST) at Trivandrum.

His major research and technological development interests are in industrial and environmental biotechnology, which span over biomass to fuels & chemicals, waste to wealth/energy, industrial enzymes, solid-state fermentation, etc.

Professor Pandey is Adjunct/Visiting Professor/Scientist in universities in France, Brazil, Canada, China, Korea, South Africa, and Switzerland and also in several universities several in India. He has ~1400 publications/communications, which include 16 patents, 87 books, 700 papers and book chapters, etc. with h index of 100 and >45,000 citations (Goggle scholar). He has transferred several technologies to industries and has done industrial consultancy for about a dozen projects for Indian/international industries.

Prof Pandey is Editor-in-chief of Bioresource Technology, Honorary Executive Advisors of Journal of Water Sustainability and Journal of Energy and Environmental Sustainability, Subject editor of Proceedings of National Academy of Sciences (India) and editorial board member of several international and Indian journals.

Professor Pandey is the recipient of many national and international awards and honours, which include Dis-

tinguished Professor of Eminence with global impact in the area of Biotechnology, Precious Cornerstone University, Nigeria (2020), Highest Cited Researcher (Top 1% in the world), Clarivate Analytics, Web of Science (2019); IconSWM Life-time Achievement Award 2019, International Society for Solid Waste Management, KIIT, Bhubaneshwar, India (2019); Yonsei Outstanding Scholar, Yonsei University, Seoul, Korea (2019), Highest Cited Researcher (Top 1% in the world; Top 10 in India), Clarivate Analytics, Web of Science (2018); Life-Time Achievement Award from the Biotech Research Society, India (2018); Life-Time Achievement Award from Venus International Research Awards (2018), Most Outstanding Researcher Award from Career360 (2018), Life-Time Achievement Award from the International Society for Energy, Environment and Sustainability (2017); Academician of European Academy of Sciences and Arts, Austria (2015); Honorary Doctorate degree from Univesite Blaise Pascal, France (2007); Thomson Scientific India Citation Laureate Award, USA (2006); UNESCO Professor (2000); Raman Research Fellowship Award, CSIR (1995); GBF, Germany and CNRS, France Fellowships (1992) and Young Scientist Award (1989), etc. He is Fellow of various academies, which include Royal Society of Biology, UK (2016); International Society for Energy, Environment and Sustainability (2016); National Academy of Sciences, India (2012); Association of Microbiologists of India (2008), International Organization of Biotechnology and Bioengineering (2007) and the Biotech Research Society, India (2005).

Professor Pandey is Founder President of the Biotech Research Society, India (www.brsi.in); Founder & International Coordinator of International Forum on Industrial Bioprocesses, France (www.ifibiop.org), Chairman of the International Society for Energy, Environment & Sustainability (www.isees.in), Editor-in-chief of Bioresource Technology (http://ees.elsevier.com/bite/), Honorary Executive Advisor of Journal of Energy and Environmental Sustainability (www.jees.in), Journal of Systems Microbiology and Biomanufacturing (https://www.springer.com/journal/43393), Journal of Environmental Sciences and Engineering (http://neerijese.org/editorial-board/), Subject Editor, Proceedings of National Academy of Sciences, India (https://www.springer.com/life+sciences/journal/40011) and Associate Editor, Biologia – Section Cellular and Molecular Biology (https://www.springer.com/journal/11756/editors) and editorial board member of several international and Indian journals.

Last but not the least, Prof Ashok Pandey is Advisory Board Member of Biotech Express Magazine along with Prof Sudhir Kumar Sopory and Prof K P Mishra. Prof Sir Ashok Pandey is among the first few scientists (Prof Kambadur Muralidhar, and few others) who joined our board in 2013 when the magazine was launched and since then providing valuable advice and critics toward the content selection and publication. Prof Pandey, BRSI and Biotech Express share a common goal i.e. Promotion of Indian Science. We proudly congratulate Prof Ashok Pandey on this unprecedented achievement on behalf of of Biotech Express Magazine.

Obituary

Hyderabad-based biotechnologist Dr B S Bajaj passes away at 93

Dr. B.S. Bajaj (DoB: 19/9/1927), founder of Federation of Asian Biotech Associations (FABA), which organizes BioAsia, a prestigious global Bio Business Forum held every year in Hyderabad in association with the Government of Telangana, passed away on 28th July, 2020.

Dr. B. S. Bajaj, MSc; PhD; FPSI was the Founder and Chairman - All India Biotech Association-Southern Chapter (AIBA-SC), Founder and Secretary General - Federation of Asian Biotech Associations (FABA), and former member, AP Govt. Biotech Advisory Council, former member of Board of Directors of NATCO Pharma Ltd, Pacific Hospital (Pvt) Ltd, Otira Pharmaceuticals Private Ltd., and Transcell Biologics (Pvt) Ltd, Confederation of Indian Industry (CII) and National Committee on Biotechnology.

Dr. B.S. Bajaj (1927-2020)

Dr. B.S. Bajaj had served as General Manager, IDPL, Rishikesh (1981-1985), Executive Director, Torrent Gujarat Biotech Ltd, Vadodara(1991-1998), Director, NATCO Pharma, Hyderabad (2002-2008). He was a member of SBTIC incubation center set up by the Department of Biotechnology, Government of India in Genome valley and also served as a member of Scientific Advisory Committees of CSIR Laboratories. He was the Vice-Chairman of Export Promotion Forum in Biotechnology, Govt. of India. He had over 50 years of experience in R&D in the areas of pharmaceuticals and antibiotics in India.

Dr. Bajaj has made immense contribution in the growth of Pharma and Biotechnology industries in India. In 1980's while working in Indian Drugs and Pharmaceutical Limited (IDPL) Rishikesh, Vidharbhaa, he played a key role in getting technology transfer for antibiotic research and manufacturing from different countries to Indian Pharma companies. With this technology transfer agreement, Indian Pharma companies could manufacture drugs at a much cheaper cost.

He was instrumental in expansion and modernization of IDPL, Rishikesh plant and setting up of grass-root highly automatic Penicillin G fermentation plant at Baroda, from design to commissioning and stabilization. He thus made significant contribution to make the Country self-sufficient from 80% import of domestic requirements to surplus availability from indigenous sources, together with some other Units. In the academic front, he had a strong R&D experience, had published more than 75 scientific publications and guided several students for post-graduate and PhD Degrees.

He had spent more than a decade in creating global bio-business and Pharma platforms and forums to drive investments into these sectors in India. Under the fold of FABA and BioAsia Dr. Bajaj boosted bio-economy in India, particularly to the state of erstwhile Andhra Pradesh and the present Telangana.

Through his superior leadership and exceptional professionalism, he had been able to efficiently conduct several bio-partnering meetings involving prestigious multinational companies (MNCs) leading to millions of dollars of investments in India. He played a key role in bringing biotech policy for the state of earlier Andhra Pradesh and recommended the same to Government of India.

Several memoranda of understanding (MOUs) had been signed with the international organizations like BioCat of Spain, Catalonia Government, European Federation of Biotechnology, Russian Biotechnology Society, Association of German Biotech Companies (VBU), Bio-industry Park Canavese, Italy to bring together industry in all these countries with India. His most distinguished achievement has been bringing 20 Asian countries under the fold of Federation of Asian Biotech Associations and help in bilateral agreements for export of medicines.

Dr.Bajaj had worked with the local Government in bringing biotech cluster under one roof called "Ge-

Meeting in memory of BioAsia founder

SPECIAL CORRESPONDENT
HYDERABAD

A virtual meeting in memory of B.S. Bajaj, founder of BioAsia, a prestigious global conclave of biopharma held every year in Hyderabad, was organised by the Federation of Asian Biotech Associations (FABA) here on Saturday. He passed away on July 28.

About 40 industry leaders and family members of Dr. Bajaj participated in the event. Prominent FABA members who attended included its patron and IAS officer B.P. Acharya, chairman and managing director of Bharat Biotech Krishna Ella, Director of Centre for Cellular and Molecular Biology Rakesh Mishra, and Director of National Animal Resource Facility Suresh Pothani.

It was agreed at the meeting to rename 'FABA Special Award' as 'Dr. Bajaj Memorial Award' and recommend his name to the

B.S. Bajaj.

State government for Padma award. Mr. Acharya said that Dr. Bajaj was instrumental in developing the biotech sector in Hyderabad and paved the way for the growth of Genome Valley. He put Hyderabad on the global map of biotechnology.

CEO BioAsia and Director, Telangana Life Sciences, Shakti Nagappan said that Dr. Bajaj succeeded in bringing 20 Asian countries under the fold of FABA.

nome Valley". Today Genome Valley is the most successful bio-cluster in the country with 300+ Pharma and Biotech companies- major, small and medium range including start-up companies. The Genome Valley has prestigious companies like Bharath Biotech and Biological E- Limited producing vaccines; Novartis, Vimta Lab and others. I consider this was the most notable achievement of Dr. Bajaj.

Dr. Bajaj ensured industry-academia interface and helped formulate the first biotech policy of Telangana that paved the way for the growth of Genome Valley and BioAsia as an annual event to showcase it. He has spent more than a decade in creating global bio-business and Pharma platforms and form to drive investments into these sectors in India. Through superior leadership and exceptional commitment and professionalism, he had been able to efficiently conduct several bio-partnering meetings involving prestigious MNCs leading to millions of dollars of investments into India. Dr. Bajaj has given to India and the world, BioAsia, to boost bio-economy globally.

BioAsia also provided the platform to recognise the services rendered by distinguished scientists to the field of Biotechnology through "Genome Valley Excellence Awards", and FABA Special Award", for young scientists in the form of "BioAsia Innovation Awards" and students with "Young Minds Awards". Some of these awardees include Nobel Laureates and other distinguished scientists around the world. Some of these include Dr. MK Bhan, Prof. E. Premkumar Reddy, Prof. G. Padmanabhan, Prof. Guntaka V Rama Reddy etc.

Dr. Bajaj had bestowed with several awards which include, BioAsia 2008 Award, Maryland India Business Roundtable (MIBRT), Inc., U.S.A bestowed him with an award for "Global leadership, commitment, vision and efforts to promote Biotechnology and Life Sciences for the last 50 years and for organizing BioAsia conferences" and Government of Catalonia (Spain) felicitation for fostering partnership between Andhra Pradesh and Catalonia, State of Spain, in Biotechnology on February 3, 2010, during BioAsia by presenting a Gold Plate with citation and a letter of appreciation from the Vice President of Catalonia Government. During BioAsia 2019, the Global Bio Business Forum, Dr. Bajaj was awarded with the FABA Lifetime Achievement Award for his significant contribution in the growth of biotechnology in India.

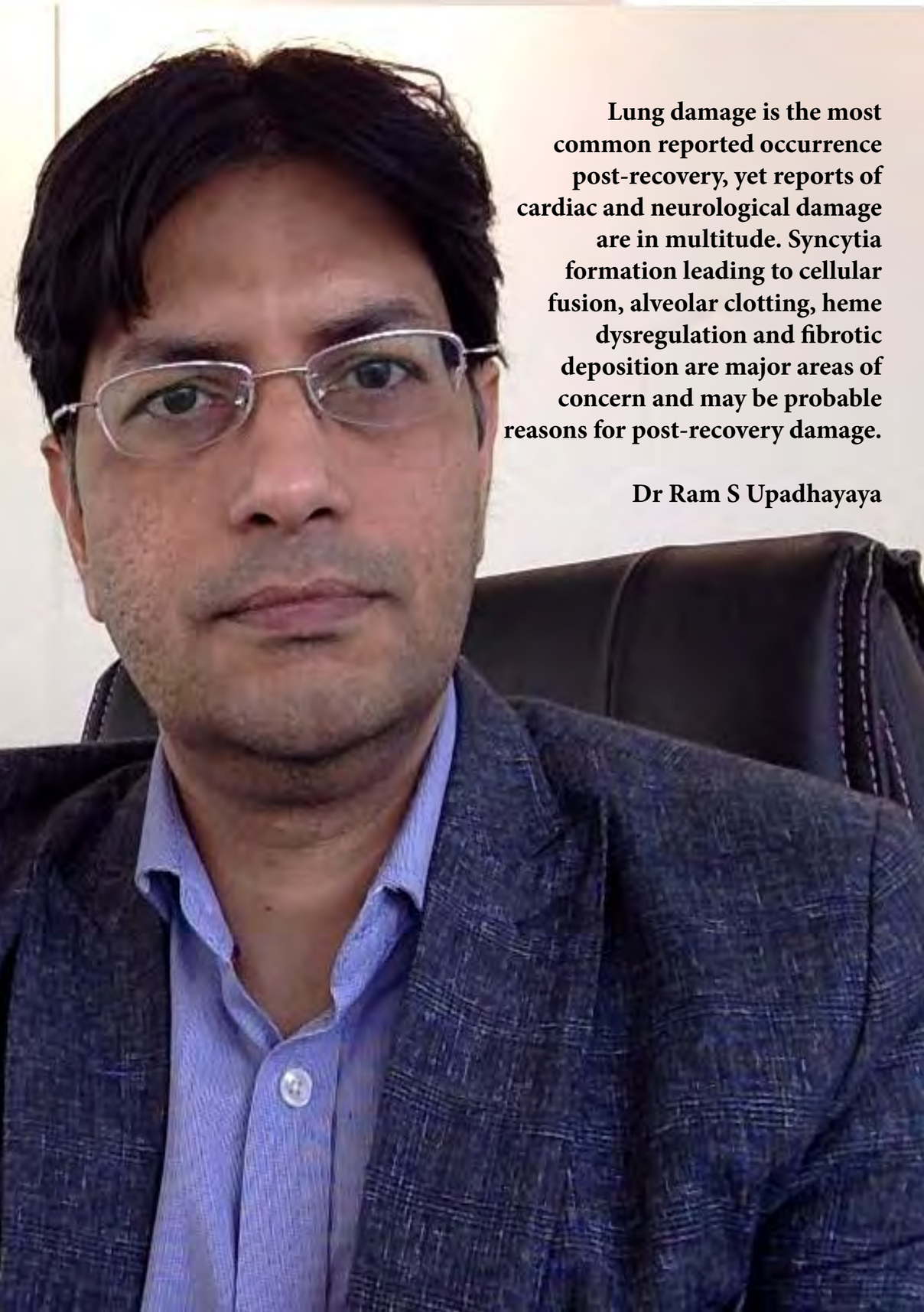
Another dream project of Dr. Bajaj was FABA Academy, which he witnessed its launching on 19th Feb, 2020 during BioAsia 2020. FABA Academy forms a bridge between the Academy and Industry in human resources development. The focus is on skill development among the science graduates and post graduates so as to make them industry-ready. The EC members of FABA and the Advisory committee of FABA Academy are highly indebted to Dr. Bajaj for conceptualizing a forum that enables the academy and industry together and for providing a global platform to promote Parma and Biotech industry in the form of BioAsia.

Prof. P Reddanna
Executive President,
Federation of Asian Biotech Association (FABA)
FABA website: http://biofaba.org/

Interview

Dr Ram S Upadhayaya
CEO, Laxai Life Sciences

How to approach COVID-19 as biopreneur? Talk with Dr Ram S Upadhayaya



Lung damage is the most common reported occurrence post-recovery, yet reports of cardiac and neurological damage are in multitude. Syncytia formation leading to cellular fusion, alveolar clotting, heme dysregulation and fibrotic deposition are major areas of concern and may be probable reasons for post-recovery damage.

Dr Ram S Upadhayaya

Dr Ram Shankar Upadhayaya has 20+ years of experience of R&D in academia and industry in the field of Medicinal chemistry and Molecular Oncology. He has served Ranbaxy Research Ltd., Delhi, India, Lupin Ltd., Institute of Molecular Medicine, Delhi; TCG Lifesciences Pvt. Ltd.; Bioorganic Chemistry Department, Institute of Cell and Molecular Biology, Uppsala University, Sweden; Max Planck Institute (MPI), Berlin Germany.; Medical Research Council (MRC), London.; Head, Medicinal Chemistry at Bioimics AB, Uppsala, Sweden.

Dr. Ram is CEO of Laxai Life Sciences which is a flagship Contract Research Organisation based in Hyderabad, India. Dr. Ram is providing leadership and scientific expertise to global drug discovery research (Oncology, immunoncology and inflammation) within paradigm of Contract Research Organizations.

This is the second time we are asking questions from an expert on COVID-19 pandemic, the first one was Prof. Guntaka Ramareddy, the discoverer of Hep B genome and its recombinant vaccine in India. In this interview with Dr Ram we are trying to know how he sees the biological pandemic like COVID-19 when he is currently working in Stockholm, Sweden.

Dr. Ram is a veteran scientist who has been involved in development programmes for various novel drugs and has been instrumental in various drug development of clinical candidates in the field of infectious diseases (anti-viral and anti-bacterial) and Oncology candidates.

About Laxai, for last decade Laxai has been instrumental in driving various new drug development programmes for Indian & Foreign Pharmaceutical and Biotech Industry. Dr. Ram himself who was Chief Scientist in Laxai before he took the responsibility as CEO, has played key roles in various such programmes and has also been responsible for forging strategic partnerships between Laxai & Council of Scientific & Industrial Research (CSIR), Govt. of India. The partnership aims to accelerate the development of solutions for diseases of national interest such as COVID-19. As per Dr. Ram, this partnership will allow to bring expertise, experience & knowledge from the best of both worlds, creating an effective synergy which will lead us to effective & safe treatment for diseases such as COVID-19.

We would like to thank Dr. Ram for taking time for this discussion with us wherein we will take few perspectives from Dr. Ram, considering his viewpoint as a scientist and his suggestions on various aspects of-COVID19 pandemic, treatment and what should be the future directions for our scientific community in India.

1. How did you become interested in COVID-19 research?

A pathogen is usually associated with a medical crisis. COVID-19 has disrupted the basic social nature of human life worldwide. Economies have gone for a tailspin, unprecedented rise in unemployment and above all the fear psychosis has ruined our normal life. As a scientist it is my duty to seek a solution or at least make a sincere effort to find a strategy to tackle this virus...!

2. Given the complexity of COVID-19 infection what are the post recovery complications?

One of the most intriguing observation is post-recovery organ damage in COVID-19 patients with severe disease presentation. Although lung damage is the most common reported occurrence post-recovery, yet reports of cardiac and neurological damage are in multitude. In the context of lungs several serious physiological perturbations have been reported. Syncytia formation leading to cellular fusion, alveolar clotting, heme dysregulation and fibrotic deposition are major areas of concern and may be probable reasons for post-recovery damage. Cardiac abnormalities were a disturbing finding from a study of 100 patients recovered from COVID-19 in Germany out of which nearly 66% had recovered at home. More than 75% of these subjects either had structural changes in their heart or had biomarkers relevant to heart attack even after two months post-recovery. Neuro-invasion by SARS-CoV-2 virus is a reason for neuronal complication. Post-recovery neurological abnormalities have also been reported. In a recent study published in Lancet, neurological symptoms were presented in 55% COVID-19 patients studied during a period of 3 months post-recovery. COVID-19 patients had statistically significantly higher bilateral gray matter volumes in olfactory cortices, hippocampi, insulas, left Rolandic operculum, left Heschl's gyrus and right cingulate gyrus and a general decline of mean, axial and radial diffusivity, accompanied with an increase of the fractional anisotropy in white matter.

Are these damages irreversible and can they be treated? At the molecular level one is left to wonder the mechanisms responsible for such havoc created! The difference between SARS CoV and SARS-CoV2 is delineated at the base-pair level in the context of genomics, both being ~80% similar. But how the differences trigger such dramatic changes in pathogenicity is yet to be elucidated.

LAXAI

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LAXAI Life Sciences Pvt. Ltd. aims to produce fast and innovative solutions to global pharmaceutical and biotechnological firms within the space of integrated contract research. We combine Science, Innovation and People to help our clients strengthen their competitive advantage, while providing high quality, quick and reliable services.

In summary, while I try to seek solutions for aiding recovery of patients, yet the post-recovery scenario is also a key area of my interest. The latter needs better and in-depth understanding of the pathophysiology of the disease at the molecular level!

3. What in your opinion are the challenges to tackle COVID-19?

COVID-19 is a recent scourge that has practically affected every part of our life. Though an effective vaccine is the need of the hour, however given the highly mutating nature of the coronavirus an effective long lasting vaccine may be an uphill objective to achieve. Another mutating virus, influenza virus, has made us to come in terms with different vaccines each year; depending on the prediction from WHO. This can also be a reality with COVID-19! There are at least 11 SARS-CoV-2 strains identified globally with six of them identified in India. Hence, the major question is can we have a treatment regime apart from the preventive vaccine regime? This is the third coronavirus attack after SARS and MERS and in all probability will not be the last one! Can we design drugs that can tackle future coronavirus variants? This is a futuristic approach that can spare humanity of another coronaviral crisis!

4. Why do you think drugs/vaccines are essential when the whole world is still waiting for a cure and putting all efforts to get a solution as soon as possible?

Vaccine development is usually a long term affair, though due to the current emergency many rules are being relaxed. A new drug discovery project consumes at least 6-8 years on a fervent pitch and mankind cannot witness the rising death toll silently.

As an alternative why not try existing approved drugs prescribed for other indications against COVID-19? There are a plethora of drugs and based on their molecular properties many have the potential to target COVID-19. There are more than 15 anti-cancer drugs, nearly 4 anti-helminths, nearly a dozen anti-inflammatory therapies that can potentially be harnessed to treat COVID-19 associated complications.

The objectives for both new drug discovery and drug repurposing are same with respect to targets. Either viral or host factors are targeted. Viral factors like RDRP are targets for drugs like Remdesivir and Favipiravir. Targeting host factors largely involve host proteins that facilitate viral entry and replication and contribute to the cytokine storm. Multiple existing drugs are now being tested both to arrest viral replication and control the debilitating ARDS. While drugs like Nafamostat, Umifenovir and HCQ are touted to inhibit viral replication by inhibiting fusion processes, other drugs like colchicine, dexamethasone and budesonide are being harnessed to arrest the cytokine storm and ARDS. On the new drug discovery front the viral mPro has emerged as a plausible target and multiple organisation worldwide are deep into R&D to develop drugs against this target.

As a matter of fact, drug repurposing is the best bet at this time and periodically news of old drugs as effective therapies is popping in. Dexamethasone, Remdesivir, Favipiravir, Tocilizumab and Itolizumab are already approved examples and many more are to follow. Moreover, combinatorial therapies addressing multiple facets of COVID-19 infection is a silver lining in this repurposing era!

5. How your Personal background/upbringing/early education and motivation to pursue research career can help to find the answers of your questions?

I have always been fascinated by the overlap of multi-disciplinary science when it comes to human welfare, health in particular. Being an organic chemist and having done my doctoral study in medicinal chemistry, I developed a profound interest in drug discovery. Its a unique platform where multiple wings of science work in tandem in the true spirit of R&D. I have been associated with and have led multiple successful drug discovery projects in the field of infectious diseases and oncology. This R&D journey of two decades has transformed me to always ask questions and seek the answers which can benefit mankind!

6. What is the role of biotechnology in your job?

In spite of great research, we still don't have a concrete answer as to why this virus is associated with a vast spectrum of pathobiology. The virus infection in overwhelming numbers results in asymptomatic cases, triggers mild symptoms like anosmia while in some patients, life threatening strokes and ARDS are reported. To decipher this nexus, understanding the viral machinery vis-a-vis the host requires tremendous application of biotechnology. Elucidation of signalling pathways, protein dynamics, epigenetics of regulation require cutting edge biotechnology tools. Better understanding of these processes will translate into effective drugs and vaccines. I believe biotechnology can also be used to analyse any genetic predisposition towards disease severity.

7. Can you tell us Milestones of your research till now and in particular in COVID19 R&D?

My research work has yielded novel interventions against TB, Leishmaniasis and HIV. Apart from this, my research work has translated into novel molecules targeted against cancer. In recent times my activities in COVID-19 research includes both new drug discovery as well as repurposing. Laxai Life Sciences, whom I presently represent as CEO, has entered into collaboration with CSIR-IICT, Hyderabad to reduce the import dependency for for active pharmaceutical ingredients (APIs) and key intermediates.

Apart from this we have collaborated with CSIR, Govt of India to conduct clinical trials of combinatorial therapies against COVID-19. Through your platform, I wish to convey my sincere thank to Dr. Shekhar Mande (DG-CSIR), Dr. Ram Vishwakarma (Ex-director-IIIM, Jammu, Advisor-CSIR) and Dr. Chandrashekar (Director-IICT) for all the support that we have got up until now due to which Laxai has been able to make significant leaps to make both novel and repurposed drugs for COVID-19. It is because of the continuous support received from CSIR that we are now in the clinical phase of testing programme for few of our target molecules for COVID-19 treatment.

8. What aspects of your work do you think could be described as Indian science?

Personally, I believe science should not have any geographical boundaries. Yet scientific research in India is really making impact worldwide! Notwithstanding, a noteworthy aspect of my research has been to minimize foreign dependencies. We have covered a broad spectrum of activities; and conceptualising ideas has been the distinguishing aspect of my research activities. On a translational aspect, developing smarter molecules and making them in India at affordable price has been my top priority.

9. Can you tell us about future goals of your lab?

My lab is dedicated to 'seek and deliver' from India. We are chasing a handful of human diseases to develop novel therapies. I strongly believe that right from elucidation of the mechanistic pathways and target selection to a clinical candidate nomination can be done in India. The lab is dedicated towards this mission, collaborations are needed but they will be a truly "IDEATED & MADE IN INDIA" endeavour!

10. Sir, Any message to global Life sciences community and in particular to India?

The world has witnessed how efficiently a 1.3 billion population has stood up against a deadly virus. Despite having limitations in the healthcare facilities to deal with such a large population,the rate in India is one of the lowest globally. India has the top 2 vaccine candidates for the earliest entry (though one is in collaboration with Oxford University). India has the world's largest vaccine producer churning out 1.5 billion doses annually. Given the depth of our manpower, both intellectually and otherwise, India can be the hub of pharmaceutical research. The right will and the zeal to deliver can make us a world leader in scientific research and development.

Views

Sustainability and Precision in Indian Agriculture: a need of the day

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Agriculture being the lifeline of rural India makes it the second-largest food producer in the world. The ongoing agricultural activities are responsible for sustainable growth in agriculture, and making the country self-reliant.

Indian agriculture sustains around 18% of the world population on just 2.3% of geographical area with only 9% of the land globally available for agriculture. With the beginning of the 21st century, India has become a global power in major economic sectors with consistently higher economic growth.

However, Indian agriculture is considered a subsistence agriculture, which causes concerns for food and nutritional security. Moreover, it has become a thankless, risky, and back-breaking job, especially as it gives marginal returns. Just one crop failure, either because of abiotic/biotic stress or any other reasons, and most of the farmers loses their sustenance.

Indian agriculture, being the victim of the green revolution, in its way to intensive agriculture is presenting the dark reality wreaked by the inappropriate adoption of green revolution. Although the green revolution played a major role in boosting farm productivity and food security, we need now to adopt strategies for the evergreen revolution by embracing conservation and precision agriculture, combined with integrated nutrient, pest, and natural resource management for wider adaptability.

In the next few decades, the agriculture sector would have to face several threats and challenges in addition to the problems emanating from the imbalanced demand and supply. Seed, fertilizers, and irrigation are some of the important inputs in agriculture, but the sadder part of it is that often the farmers are not able to get the input cost, particularly because of very less minimum support price of the produce.

Some of the crops, like rice, require a considerably higher amount of irrigation water, causing the lowering-down of the water-table, soil salinity, and deterioration of water quality. Therefore, it would be appropriate to grow

the water-demanding crops in the places with plenty of rainfall and/or in the areas having a shallow water-table. Moreover, to overcome the barrier of declining productivity, there is a need to herald a rainbow revolution by making a shift from wheat rice crop-rotation and including the nitrogen-fixing pulse crops in-between.

Studies indicate that nearly 121 million ha land in India degraded due to soil erosion and more than 8 million ha area is affected by soil salinity and water-logging, and the situation is becoming worse day by day. Problems are further infuriated by the imbalanced use of chemical/synthetic fertilizers and excessive mining of micro-nutrients from soil by crop plants, leading to the deficiency of nutrients in soil and reduced quality and quantity of produce.

As the Law of Marginality indicates that "cultivation on marginal soil with marginal inputs produces marginal yields and supports marginal living", we need to adopt Zero Budget Natural Farming to minimize the input cost and to maximize the output to the marginal farmer.

With the increasing population, the demand for food and other commodities will increase, and it has been estimated that demand for food grains would considerably increase to 345 million tonnes by 2030. Hence, the production of food grains needs to be increased at a rate of 5 million tonnes annually. This is where science/technology can help further improving productivity for higher and sustainable agriculture. Therefore, to tackle the issues of food security and to feed the burgeoning population, we need to move from conventional farming to more efficient, sustainable, conservation, and precision agriculture with better natural resource management.

Since the natural resources are continuously shrinking and deteriorating, necessary attention is needed to improvise the agricultural sector, and the tools and techniques of molecular biology, biotechnology, and nanotechnology have the potential to address many of the future challenges.

In addition to crop husbandry, horticulture, animal husbandry, aquaculture, poultry, fishery, and post-harvest processing and value addition to the agricultural products are very much essential. The condition of agriculture market in India is not good, and unorganized supply chain from producer to consumer suffers from a loss of 18-25% of the produce.

To improve the shelf-life and demand-driven commodity traits of certain perishable commodities through different post-harvest processing can increase the availability of food materials to feed the ever-growing global population. Supports from the government would be equally important by promoting research and development in agricultural technologies, providing the timely supply of Agri-inputs, infrastructures to minimize the wastage, and agricultural e-marketing.

Numerous challenges concerned with climate change are appearing in the way to agriculture as it is aggravated to more frequent natural calamities like drought and flood, particularly in India. By the end of 21st century, the global temperature is likely to increase by 1.8-4.0°C, which might lead to more frequent extreme environmental conditions.

Therefore, to produce sufficient nutritious food for the continuously growing population under the changing climatic conditions and diminishing natural resources, a challenging task in front of the agricultural scientists of the Indian Council of Agricultural Research is to focus on the climate-resilient agriculture, conserving the stress-tolerant genetic resources of plants and animals, and minimizing the wastage of food materials by post-harvest processing technologies. Towards the protection of the environment, efforts should be made on the adoption of integrated pest management, developing more effective and safer pesticides, and promoting bio-safety/security components in the country.

The need of today is strategic thinking and rapid but thoughtful action that would result in increased production and reduced wastage of food materials. Continuous efforts have to be made to keep India moving forward and maintaining self-sufficiency in food production for sustainable food/nutritional security.

At the same time, the need of the hour is to improving farmer's skills to adopt newer technologies for sustainable/precision agriculture. As Indian agriculture is heavily dependent on the natural resources, we need to give due consideration to the conservation and preci-

sion agriculture, zero tillage practices, integrated crop, nutrient, water, and pest management practices, and to integrate the various public sector support system with private initiatives (public private partnership) for holistic development.

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Review Article

An Insight About COVID-19: The Deadly Pandemic

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INTRODUCTION

This review paper is an attempt to understand and recapitulate the published scientific articles/research papers about the deadly pandemic Coronavirus. In this review paper, we tried to provide an insight regarding early findings on the symptoms, causes, clinical diagnosis, spread, as well as prevention and control of COVID-19. This review is based on the information collected via various research publications on different websites. It can be helpful to get vital information for researchers, scientists, and anyone curious to know about this deadly disease. We hope this paper will support government, agencies or companies to build-up the strategies against control and prevention of this deadly disease during this time of health emergency.

OVERVIEW

Before the world could be fully recovered from the loss caused by the last H1N1 swine flu pandemic of 2009-2010 which killed about 575,400 people across the globe, the deadly Coronavirus pandemic came up. The Coronavirus Disease 2019 (COVID-19) is caused by a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case of this virus was reported in Wuhan, China, on December 31, 2019. About a month later, on January 30, 2020, this outbreak was declared as a Public Health Emergency of International Concern. Since it has been spreading to every continent with alarming speed, on March 11, the World Health Organization (WHO) officially declared the outbreak of COVID-19 a pandemic. Never before this has the WHO has declared a pandemic over a coronavirus.

Many public health groups across the world, including the US Centers for Disease Control and Prevention (CDC), WHO and government of countries are monitoring the pandemic and posting updates regularly on their websites. Scientists and researchers started to research the source of the new coronavirus immediately after the outbreak. The first genome of COVID-19 was published by the research team led by Prof. Yong-Zhen Zhang, on January 10 2020 (Virological.org., 2020). As of now no treatment for the disease has been identified, but labs are working on various types of treatments, including a vaccine.

SYMPTOMS

The full breadth of symptoms of COVID-19 is still being studied. Signs and symptoms of COVID-19 may appear two to 14 days after exposure, and so far, as per the CDC, the most evident symptoms of the disease are rise in body temperature, dry coughing and shortness of breath. These may also be accompanied by the headache, sore throat, abdominal pain and diarrhoea, have been reported, but are less common. COVID-19 can also cause respiratory issues that lead to severe problems, such as pneumonia and loss of smell. The disease is caused mostly in old age people, but there are cases in young people also. Furthermore, it seems to become more sensitive and prone with age. As per the study done by the JAMA, the 30- to

79-year-old age bracket predominates the cases identified in Wuhan City as of now, where the outbreak began. Children comparatively seen to be at less risk of suffering noticeable symptoms of the disease. However, a recent study of 2,000 children confirmed or suspected to have COVID-19 found that 6% developed severe or critical illness (Dong et al., 2020).

TRANSMISSION/ DEADLINESS

The novel coronavirus is very contagious and appears to be reasonably quickly spread. However, it is not among the most transmissible diseases out there. The primary reproduction number, also called the R-nought value, is the expected number of individuals who can catch the virus from a single infected person. This value for the novel coronavirus is estimated to be between 2 and 2.5, at the moment (Liu et al. 2020). According to WHO, there are four levels of COVID-19 transmission. These are countries or local areas with: 1. No cases reported. 2. Sporadic cases. 3. Clusters of cases (grouped in place and time), or 4. Community transmission (WHO COVID-19 situation report). If we talk about the route for its transmission, Chinese health authorities (NHC 2020, NHC and CDC, 2020) described three main transmission routes for the COVID-19: 1) droplets transmission, 2) contact transmission, and 3) aerosol transmission.

This disease spreads mostly through person-to-person contact within about a 6-foot (1.8 meters) radius. People with COVID-19, spread viral particles through coughing and sneezing. The particles can land in the mouths or noses of those nearby. It might also be possible to catch SARS-CoV-2 by touching a surface where the virus has recently landed and then touching one's mouth, nose or eyes, but CDC officials believe this method of transmission is less common. Some coronaviruses can live on surfaces for days, but not much is known about the new coronavirus' ability to survive on surfaces. There is limited evidence that the new coronavirus can spread through faeces as well.

LIFE PERIOD

It is still unknown as to how long can the new coronavirus linger on surfaces. A new analysis found that the virus can remain viable in the air for up to 3 hours, on copper for up to 4 hours, on cardboard up to 24 hours and on plastic and stainless steel up to 72 hours (The New England Journal of Medicine). In The Journal of Hospital Infection, it is reported that the new coronavirus resembles other human coronaviruses, such as its "cousins" that cause SARS and MERS, it can stay on surfaces such as metal, glass or plastic for as long as nine days (In comparison, flu viruses can last on surfaces for only about 48 hours). However, some of them do not remain active for as long at temperatures higher than 86 degrees Fahrenheit (30 degrees Celsius).

PREVENTION AND CONTROL

General precautionary measures recommended by the CDC include washing hands often with soap and water for at least 20 seconds; avoiding touching eyes, nose and mouth with unwashed hands; avoiding close contact with sick people; staying home and cleaning and disinfecting touched objects and surfaces frequently. The common disinfectant used against coronavirus is diluted household bleach solutions, alcohol solutions containing at least 70% alcohol. The bleach solution can be prepared by mixing five tablespoons (one-third cup) of bleach per gallon of water or four teaspoons of bleach per quart of water, the CDC wrote in a set of recommendations.

The public health and social measures are measures helpful to reduce transmission of COVID-19. These include individual and environmental measures, detecting and isolating cases, contact-tracing and quarantine, social and physical distancing measures and vaccines and treatments. Since till now vaccines and specific medications are not yet available, other public health and social measures can play an essential role in reducing the number of infections and saving lives (WHO coronavirus report, April 1, 2020).

CURE

As there is no cure for this coronavirus disease until now, the treatments given are basically supportive care for influenza (seasonal flu) and other severe respiratory illnesses. These treatments primarily treat the symptoms such as fever, cough and shortness of breath. In mild cases, this might simply mean rest and fever-reducing medications such as acetaminophen (Tylenol) for comfort.

In hospitals, patients are sometimes treated with the antiviral drug oseltamivir, or Tamiflu, which seems to suppress the virus' reproduction. The doctors are testing an array of other antivirals initially designed to treat Ebola and HIV, Nature Biotechnology reported. In cases in which pneumonia inhibits breathing, treatment involves ventilation with oxygen. Ventilators blow air into the lungs through a mask or a tube inserted directly into the windpipe.

Researchers around the world are developing more than 165 vaccines against the coronavirus, and 31 vaccines are in human trials. Vaccines typically require years of research and testing before reaching the clinic, but scientists are racing to produce a safe and effective vaccine by next year.

IMPACT ON ANIMALS

The origin of this virus is unknown, though it is found that coronaviruses (which also include SARS and MERS) are passed between animals and humans. Research comparing the genetic sequence of SARS-CoV-2 with a viral database suggests it originated in bats. Since no bats were sold at the seafood market in Wuhan, it is suggested that an intermediate animal, possibly the pangolin (an endangered mammal) is responsible for the transmission to humans.

The COVID-19 pandemic has been spread mainly by human-to-human transmission, but there are a handful of reports of the infection in animals, which raises new questions about human-to-animal transmission. In February 2020, the first known case of an animal infected with COVID-19 was a dog in Hong Kong. A second German Shepherd pet dog in Hong Kong was reported to be positive for COVID-19 virus on March 20. Later in April, a four-year-old female Malayan tiger, named Nadia from the Bronx Zoo in New York City was reported to be coronavirus positive by the National Veterinary Services Laboratory in Iowa. As per World Organisation for Animal Health and the WHO, no evidence has been found that pet dogs and cats can pass on the coronavirus. Nevertheless, it is suggested that anyone who has become sick should limit contact with pets as the studies are going on to study the issue more.

STATISTICS TILL DATE

As on August 12, 2020, the COVID-19 has led to more than 20,162,474 illnesses and more than 7,37,417 deaths worldwide. Below is the table of the situation in numbers as reported by WHO situation report-205.

Region	Confirmed Cases	Deaths
Globally	20,162,474	7,37,417
Western Pacific Region	3,83,739	8,911
European Region	36,41,603	2,17716
South-East Asia Region	27, 57,822	55, 564
Eastern Mediterranean Region	16,69,933	44,288
Region of the Americas	1,07,99,062	3,93,727
African Region	9,09,574	17,198

REPORT OF INDIA

On January 30 2020, the first laboratory-confirmed case of 2019-nCoV was reported in Kerala, a student returning from Wuhan. Gradually, the number of corona positive patients started to increase so, Prime Minister Narendra Modi, in the exercise of the powers under section 6(2)(i) of the Disaster Management Act, 2005, issued an order for complete lockdown in the country for a period of 21 days with effect from March 25, 2020, in order to break the chain of transmission of COVID-19.

WHO Country Office for India is working closely with Ministry of Health and Family Welfare (MoHFW) to strengthen surveillance, build the capacity of the health system and optimize 'window of opportunity' created by mandatory physical distancing in India. All transport facilities like flights, trains and buses have been suspended and as of March 25 (through an order), extension of suspension has been made till May 31st 2020. Passenger movement has been strictly restricted including inter-state travel, all efforts to ensure availability of essential commodities through its uninterrupted freight services in place. Ministry of Home Affairs (MHA) issued new guidelines to fight COVID-19 and for Unlock 1 - phased re-opening of areas outside the Containment Zones into effect from June 1, 2020 and would be effective till June 30, 2020. According to Government of India report, till 13 August, 2020, there are 6,53,622 active cases of this disease and 47,033 deaths. There has been significant improvement in the recovery rate amongst COVID-19 patients with present rate of about 60.70%.

HOW IS COVID-19 DIFFERENT FROM SEASONAL FLU?

COVID-19 causes the highest percentage of deaths in people ages 65 and older, in a similar way as that most strains of flu viruses, including those that cause seasonal flu. There is typically some herd immunity to seasonal flu; thus, many people are immune to the infection, because of vaccines or because their immune system has already fought the infection. Similarly, there might be some groups of people who have immunity to the 2019-CoV-2 virus, too, but that is an area that's still being researched. So far, COVID-19 is most deadly for people over 60 and also those who have underlying health conditions.

The difference between seasonal flu and COVID-19 is that flu viruses are spread in respiratory droplets and airborne particles, while 2019-CoV-2 is primarily spread through respiratory droplets, and in some instances may be shed in faeces. It is not yet know how vital the oral-faecal route of infection is, but it is another reason to wash your hands regularly with soap and water or use sanitizers.

CONCLUSION

Till now, the mystery about the new coronavirus disease still unsolved and very little is known about the cause, transmission and vaccine. Scientists are working day and night in order to find out more about COVID-19, and our understanding of the virus that causes it and the threat it poses may change as new information becomes available.

The disadvantage of living in the social media era is that misinformation about the disease has spread faster than the virus. However, this technological development is helping in improving the speed at which research and vaccine development can occur. Potential treatment and the first trial of a candidate vaccine are already underway, which is impressive and encouraging. It will take time for a vaccine and treatments to be studied, scaled up and reach masses. So, in the meantime, all that we can do is stay home and be safe.

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JAM 2020

JOINT ADMISSION TEST for M.Sc.

ORGANIZING INSTITUTE: IIT KANPUR

About JAM: National test for admission to M.Sc. (Two years), Joint M.Sc.-Ph.D., M.Sc.-Ph.D. Dual Degree, M.Sc.-M.S. (Research)/Ph.D. Dual Degree and other Post-Bachelor Degree programmes at IITs (Bhilai, Bhubaneswar, Bombay, Delhi, (ISM) Dhanbad, Gandhinagar, Guwahati, Hyderabad, Indore, Jodhpur, Kanpur, Kharagpur, Madras, Mandi, Palakkad, Patna, Roorkee, Ropar, Tirupati and (BHU) Varanasi) for the Academic Session 2020-21. JAM score will be used by IISc Bangalore for admission to Integrated Ph.D. programmes. JAM score will also be used by other centrally funded technical institutions like NITs, IIEST Shibpur, SLIET Punjab and IISERs for admission to their programmes.

STRUCTURE AND MODE OF JAM 2020

JAM 2020 examination will be conducted ONLINE only. A candidate can appear in either one Test Paper or two Test Papers by paying an additional fee for the second test paper. Candidates opting to appear in two Test Papers must ensure that the opted Test Papers are not scheduled in the same session.

IMPORTANT DATES FOR JAM 2020	
05 September 2019	Start of ONLINE Registration and Application Process
08 October 2019	Closure of ONLINE Application Process
09 February 2020	JAM 2020 Examination
20 March 2020	Announcement of JAM 2020 Result

EXAMINATION CITIES AND TOWNS

Agartala, Agra, Ahmedabad, Asansol-Durgapur, Bareilly, Bengaluru, Bhopal, Bhubaneswar, Chennai, Coimbatore, Dehradun, Dhanbad, Dibrugarh, Ernakulam, Faridabad, Ghaziabad, Goa, Greater Noida, Gurugram, Guwahati, Hisar, Hubli, Hyderabad, Indore, Jaipur, Jalandhar, Jammu, Jind, Jodhpur, Jorhat, Kalyani, Kannur, Kanpur, Kharagpur, Kolkata, Kollam, Kottayam, Kozhikode, Kurukshetra, Lucknow, Madurai, Mangalore, Mohali, Moradabad, Mumbai, Nagpur, Nanded, Nasik, New Delhi, Noida, Palakkad, Patna, Prayagraj (Allahabad), Pune, Raipur, Ranchi, Roorkee, Shillong, Siliguri, Thiruvanathapuram, Thrissur, Tiruchirapalli, Tirunelveli, Tirupati, Vadodara, Varanasi, Vijayawada, Visakhapatnam and Warangal.

Note: The JAM 2020 Committee may add or drop any place as an examination city/town at its discretion.

INFORMATION BROCHURE AND APPLICATION PROCEDURE

Refer to http://jam.iitk.ac.in for downloading the Information Brochure and the details of application procedure.

GROUP/CATEGORY	FEE DETAILS	
	One Test Paper	Two Test Papers
Female (All Categories)/SC/ST/PwD	₹ 750/-	₹ 1050/-
All Others	₹ 1500/-	₹ 2100/-

PATTERN OF TEST PAPERS

JAM 2020 Test papers will be fully objective type, with three patterns of questions: (i) Multiple Choice Questions (MCQ), (ii) Multiple Select Questions (MSQ) and (iii) Numerical Answer Type (NAT) questions.

Joint Admission Procedure: Admissions to various academic programmes at IITs for the Academic Session 2020-21 shall be made based on the All India merit list of JAM 2020. Candidates who qualify in any test paper of JAM 2020 will be eligible to apply for admission to all the academic programmes corresponding to that test paper, provided they also satisfy the minimum educational qualifications and the eligibility requirements as specified by the institute(s) in which admission is sought. Admission shall be given in the order of merit depending on the number of seats available at the admitting institute(s). After the declaration of JAM 2020 result, qualified candidates should apply online at common admission portal (JOAPS) through the Organizing Institute (IIT Kanpur) specifying preferences for the programmes of their interest. Further details regarding admission, prescribed fees, etc. are available on the JAM 2020 website. Reservation policy is applicable as per the Government of India norms.

ELIGIBILITY REQUIREMENT AND MINIMUM EDUCATIONAL QUALIFICATIONS (MEQ) FOR ADMISSION

In the qualifying degree, the aggregate marks or CGPA/CPI without rounding-off (taking into account all subjects, including languages and subsidiaries, all years combined) should be at least 55% or 5.5 out of 10 for General/OBC (NCL)/EWS category candidates and 50% or 5.0 out of 10 for SC/ST and PwD category candidates (If CGPA/CPI is on a different scale, it would be linearly mapped to a scale on 10).

Refer to http://jam.iitk.ac.in for MEQ and other details. Proof of having passed the qualifying degree with the required eligibility as specified by the admitting institute should be submitted by September 30, 2020.

JAM 2020 SCHEDULE		
EXAM DATE	SESSION and TIME	TEST PAPERS
09 February 2020 (Sunday)	SESSION - I 9:30 am to 12:30 pm	Biotechnology (BT), Mathematical Statistics (MS) and Physics (PH)
	SESSION - II 2:30 pm to 5:30 pm	Chemistry (CY), Geology (GG) and Mathematics (MA)

CONTACT DETAILS of JAM OFFICES		
Institute	Website	E-Mail
IISc Bangalore	http://gate.iisc.ac.in	jam@gate.iisc.ac.in
IIT Bombay	http://gate.iitb.ac.in/jam	jam@iitb.ac.in
IIT Delhi	http://jam.iitd.ac.in	jam@admin.iitd.ac.in
IIT Guwahati	http://iitg.ac.in/gate-jam	jam@iitg.ac.in
IIT Kanpur	http://jam.iitk.ac.in	jam@iitk.ac.in
IIT Kharagpur	http://jam.iitkgp.ac.in	jam@adm.iitkgp.ac.in
IIT Madras	http://jam.iitm.ac.in	jam@iitm.ac.in
IIT Roorkee	http://iitr.ac.in/jam	jam@iitr.ac.in

Featured News

Cipla receives regulatory approval for launch of Ciplenza (Favipiravir 200 mg)

JULY 24, 2020 | Biotech Express Bureau

Cipla Limited announced that it has been granted regulatory approval by the Drug Controller General of India (DCGI) for the launch of Favipiravir in the country under the brand name Ciplenza. The accelerated approval for manufacturing and marketing of the drug is aimed at meeting the urgent and unmet medical need for COVID-19 treatment options in the country through restricted emergency use.

As part of its efforts to enable speedy access to cater to the demand, Cipla will commercially launch Ciplenza in the first week of August priced at Rs 68 per tablet. To ensure fair and equitable distribution of the drug, supplies will be undertaken predominantly through hospital channels and via open channels, prioritised for regions with a high burden of COVID-19 cases.

The drug has been jointly developed by Cipla and CSIR-Indian Institute of Chemical Technology (IICT). As part of this partnership, CSIR-IICT has successfully developed a convenient and cost-effective synthetic process for Favipiravir. The entire process and Active Pharmaceutical Ingredient (API) of the drug has been transferred to Cipla to manufacture and market the drug at scale.

Favipiravir is an off patent, oral anti-viral drug that has been shown to hasten clinical recovery in COVID -19 patients with mild to moderate symptoms.

World's Cheapest COVID-19 Testing Kit developed in India by IIT-Delhi

Corosure was developed by the Indian Institute of Technology, Delhi, and is being commercially marketed by NewTech Medical Devices.

JULY 17, 2020 | Biotech Express Bureau

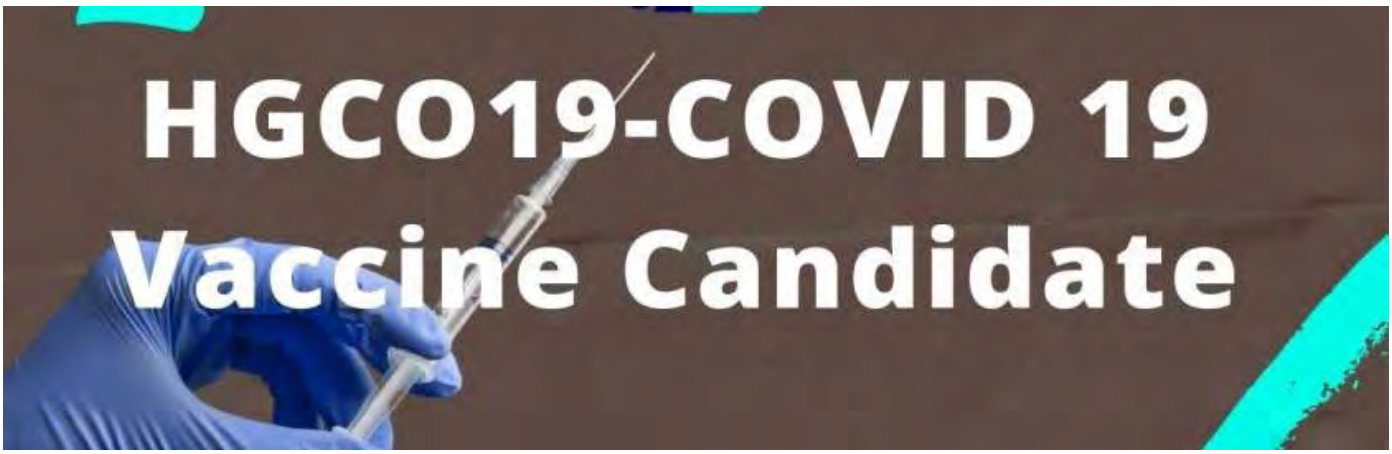
10 things you need to know about it.

1. Corosure is a fully Made-in-India test kit.
2. The diagnostic kit is available at authorised laboratories at a base price of Rs 399.
3. The test kit was developed by PhD scholars, post-doctoral fellows, and professors of IIT Delhi's Kusuma School of Biological Sciences.
4. NewTech Medical Devices, a Delhi-based manufacturing company, obtained the license to manufacture it commercially from IIT-Delhi, and has also received approval from both Indian Council of Medical Research (ICMR) and Drug Controller General of India (DGCI).
5. An RT-PCR (Reverse Transcription Polymerase Chain Reaction) also known as the swab test is one of the common tests to detect the presence of novel coronavirus. As of now, the test costs anywhere around Rs 2000-3000. Researchers at IIT-Delhi say even after adding the RNA isolation and laboratory charges, the cost per test will be considerably cheaper compared to currently available kits in the market, and the final price of the kit will be maintained at Rs 650.
6. The Corosure kit can deliver results within 3 hours.
7. According to the team at IIT Delhi, the current testing methods available are "probe-based", while the one developed by them is a "probe-free" method, which reduces the testing cost without compromising on accuracy.
8. Imagine if you had find a house in a city. It would be very hard to do it if the only description you had was "red door." It would be much easier if there is a pincode, matched to a map. Similarly, by discovering those parts of the COVID-19 virus that are extremely unique to the virus, the tests to detect COVID-19 can become more accurate and cheaper, since the test can be limited to just that specific part, without any extra tests. This is, broadly, what the IIT-Delhi team has discovered. "The primer targets unique regions where there is a spike in the COVID-19 protein. It was designed and tested using real-time polymerase chain reaction, a method

for detecting small changes in the DNA. The sensitivity of this in-house kit is comparable to that of commercial ones," said a lead researcher.
9. Using comparative sequence analyses, a method for aiding human gene identifying and inferring functions of a gene's product, the IIT Delhi team identified unique regions (short stretches of RNA sequences) in the COVID-19 and SARS COV-2 genome."These unique regions are not present in other human viruses providing an opportunity to specifically detect COVID-19," said Professor Vivekanandan Perumal, during the launch.
10. During the launch, Human Resource Development minister Ramesh Pokhriyal claimed that 'Corosure' is the World's most affordable COVID-testing kit.

DBT seed funds Gennova Biopharmaceuticals' novel mRNA-based COVID-19 vaccine candidate

JULY 30, 2020 | Biotech Express Bureau



DBT-BIRAC has facilitated the establishment of 'first-of-its-kind' mRNA-based vaccine manufacturing platform in India. It has provided seed funding for the development of Gennova's novel self-amplifying mRNA-based vaccine candidate for COVID19.

In collaboration with HDT Biotech Corporation, Seattle, US, Gennova has developed an mRNA vaccine candidate (HGCO19), with demonstrated safety, immunogenicity, neutralisation antibody activity in the rodent and non-human primate models. The company is working aggressively to ensure first human injection by the end of the year, subject to Indian regulatory approvals, informed a release from the Ministry of Science & Technology.

Speaking on the subject, Dr Renu Swarup, Secretary, DBT and Chairperson, BIRAC, said, "Diseases emanating from unknown and new pathogens require novel ideas for effective mitigation. Gennova's mRNA platform supported by DBT utilizes the advances in nucleic acid vaccine and delivery systems. This vaccine candidate that makes use of nanotechnology has shown promise to be effective in animal models. With the kind of capacities that Gennova has, I am confident that this vaccine candidate can be rapidly scaled up, once proven effective in human clinical trials."

Speaking on the development, Dr Sanjay Singh, CEO, Gennova Biopharmaceuticals, said, "Bold moves are necessary to create globally competitive and sustainable solutions. Gennova appreciates DBT- BIRAC's initiative, guidance, and financial support towards the development of mRNA based next-generation vaccine. Our partnership is poised towards creating an eco-system for cutting-edge technology, providing solution towards making a cost-effective vaccine that can reach to the masses in a pandemic situation like COVID-19."

DCGI Rejects Mylan's Request to Waive Phase 3 Trials for COVID-19 Drug

August 10, 2020 | Biotech Express Bureau

The Drug Controller General of India (DCGI) had refused to grant permission for waiving phase 3 clinical trials for sofosbuvir, a drug used to treat hepatitis C, on patients suffering from severe COVID-19, according to The Print.

"The committee recommended that the firm should conduct a phase III clinical trial on Indian patients and accordingly phase III clinical trial protocol should be submitted for review by the committee," the subject expert committee (SEC) at the Central Drugs Standard Control Organisation said in response to a request for waiver of clinical trials filed by the pharmaceutical company Mylan.

The DCGI recently came under fire from some members of the medical after it waived phase III clinical trials for itolizumab, a known monoclonal antibody that Biocon Limited has repurposed to treat cytokine release syndrome in patients with severe COVID-19.

The SEC, while adjudicating on Mylan's request, said the firm should conduct a phase III clinical trial on patients in India following the protocol requirements and that those results should be submitted to the committee.

"The committee noted that this FDC [fixed dose combination] is not approved anywhere in the world for use against novel coronavirus SARS-CoV-2," the minutes of the meeting said.

The committee also rejected the request of Gufic Biosciences for trial waiver for the use of thymosin α-1 injection as an "add-on treatment" in patients with severe or moderate COVID-19.

Nearly 200 Indian Doctors Have Succumbed to COVID-19 So Far: IMA

August 10, 2020 | Biotech Express Bureau

A total of 196 doctors in the country, majority of them being general practitioners, have succumbed to COVID-19 so far, said the Indian Medical Association (IMA) on Saturday, requesting the prime minister for his attention on the issue.

"As per the latest data collected by the IMA, our nation has lost 196 doctors, out of which 170 of them are above the age of 50 years, with general practitioners attributing to around 40 per cent of it," the IMA said expressing concerns over the safety of doctors losing their lives in the fight against the COVID-19 crisis.

In a letter to Prime Minister Narendra Modi, the IMA requested him to ensure adequate care for doctors and their families who are a special risk group and extend the state-sponsored medical and life insurance facilities to doctors in all the sectors.

"The IMA represents over 3.5 lakh doctors spread across the country providing next door affordable healthcare, it is pertinent to mention that COVID-19 does not differentiate between government and private sector and affect all same.

"Further disturbing are the reports that state that the doctors and their family members are not getting beds for admission and deficiency of drugs in most of the cases. The IMA thus requests the government of India to provide adequate attention for the safety and welfare of doctors during the pandemic," said Dr Rajan Sharma, National President, IMA

Dr R V Asokan, Secretary General, IMA, said the mortality rate among doctors due to COVID-19 has reached an "alarming proposition" now.

COVID-19: Angry Health Workers in India Launch a Strike

August 10, 2020 | Biotech Express Bureau

More than 3.5 million health workers, who have been the foot-soldiers in the COVID-19 detection efforts across India, embarked on a two-day strike from Friday, August 7, to secure better wages and proper protective equipment.

"At least 100 health workers have died of COVID-19 in the country so far, but there has been no insurance provided to them by the government," said A.R., Sindhu secretary of the Centre of Trade Unions, a key participant in the ongoing strike.

Accredited Social Health Activists or ASHA workers, are the government's recognised health workers who are usually the first point of contact in economically deprived sections, where there is limited or no direct access to health-care facilities.

They have been conducting door-to-door checks to trace COVID-19 patients.

A total of 10 unions representing the workers, who also include ambulance drivers and cooks at community centres, joined the strike. A majority of them work on contracts with state governments at a monthly salary of about 3,000 Indian rupees ($40.02).

"In some places, we had a lot of difficulty reaching households, especially in the mountainous regions… Households would be very far apart and we had to get to each of them on foot," Nagalakshmi. D, a union leader of ASHA workers in Karnataka told Reuters.

News in Focus

GSK and Sanofi Strike $2.1 Billion Deal with U.S. Government for 100 Million Doses of COVID-19 Vaccine

GlaxoSmithKline and Sanofi struck a $2.1 billion deal with the U.S. government's Operation Warp Speed program to supply an initial 100 million doses of a COVID-19 vaccine candidate under development by the two companies. In its analysis of the deal, Forbes noted that the price of a vaccine comes out to about $10.50 per dose.

That pricing follows analyses of other potential prices for COVID-19 vaccine candidates developed by other companies. A Motley Fool report shows that Moderna has a rough price for its mRNA vaccine candidate at $50 to $60 per two-dose treatment course. AstraZeneca, which is working with the Jenner Institute of Oxford University, has made arrangements with some European governments for its vaccine candidate to cost about $3 or $4 per dose, the Fool noted.

Thomas Triomphe, Global Head of Sanofi Pasteur, said the global need for a COVID-19 vaccine is "massive." Triomphe noted that the vaccine candidates under development by GSK and his company, as well as those under development from other pharma companies will be necessary in order to defeat the pandemic. He said no single vaccine or company will be able to meet the global demand on its own.

"From the beginning of the pandemic, Sanofi has leveraged its deep scientific expertise and resources to help address this crisis, collaborating with the U.S. Department of Health and Human Services to unlock a rapid path toward developing a pandemic vaccine and manufacturing at large scale," Triomphe said in a statement.

In parallel, Sanofi and GSK are scaling up manufacturing of the antigen and adjuvant to produce up to one billion doses per year globally. The companies plan to provide a significant portion of total worldwide available supply capacity to "Access to COVID-19 Tools (ACT) Accelerator," a global initiative tasked with providing equitable access to COVID-19 tests, treatments, and vaccines.

Pfizer and BioNTech Begin Global Phase II/III COVID-19 Vaccine Trial

New York-based Pfizer and Mainz, Germany-based BioNTech picked their COVID-19 vaccine candidate and plan to begin a global Phase II/III safety and efficacy clinical trial. The company had four different vaccine candidates. After reviewing preclinical and clinical data from Phase I/II clinical trials and having discussions with the U.S. Food and Drug Administration (FDA) and other countries' regulators, they selected BNT162b2 to take into larger studies.

The vaccine will be dosed at a 30-microgram level with a two-dose regimen. The vaccine is an mRNA product, with the mRNA encoding for the SARS-CoV-2 full length spike glycoprotein (S).

"Our selection of the BNT162b2 vaccine candidate and its advancement into a Phase II/III study are the culmination of an extensive, collaborative and unprecedented R&D program involving Pfizer, BioNTech, clinical investigators, and study participants with a singular focus of developing a safe and effective COVID-19 RNA vaccine," said Kathrin U. Jansen, senior vice president and head of Vaccine Research & Development for Pfizer. "The Phase II/III study protocol follows all the U.S. Food and Drug Administration (FDA) guidance on clinical trial design for COVID-19 vaccine studies. The initiation of the Phase II/III trial is a major step forward in our progress toward providing a potential vaccine to help fight the ongoing COVID-19 pandemic, and we look forward to generating additional data as the program progresses."

The companies' four vaccines had been narrowed down to the two best candidates, BNT162b1 and BNT162b2 based on safety and immune response. After a thorough analysis of the data, BNT162b2 was selected as the best candidate to advance. In addition to high levels of neutralizing antibodies in several different animal models, the candidates induced favorable viral antigen specific CD4+ and CD8+ T-cell responses, as well as showed protective effects in a primate SARS-CoV-2 challenge model, which is to say, they gave the vaccines to primates, then later injected them with the virus and it appeared to prevent infection.

The Phase II/III trial will be conducted in 120 clinical sites around the world, excluding China, but will include 39 states in the U.S. Argentina, Brazil and Germany will be included in the trial.

Philip Dormitzer, a Pfizer vice president heading up vaccines, told STAT that because the chosen vaccine candidate includes more of the spike protein, it seems to generate a stronger immune response, which should mean less variability in patient response. It also appeared to cause fewer side effects. "It just seemed a bit milder," he said. "There were fewer reactions to immunization, and that was an important mark in its favor."

They don't know exactly why the side effects with this particular candidate seem milder, although they believe it might be because of changes they made to the mRNA that make it easier for mammalian cells to produce it.

JLL Report: COVID-19 Related Vaccines Stimulate Life Sciences Real Estate Market

JLL published its JLL 2020 U.S. Life Sciences Outlook, which ranks and tracks the progress of life sciences markets, particularly in how they relate to real estate development. The report this year also takes into account the COVID-19 pandemic, which has hindered some aspects of the biopharmaceutical and life sciences industry, but not necessarily the life sciences real estate market or venture capital funding.

Not surprisingly, three specific geographic regions remain dominant for life sciences, the Greater Boston Area, the San Francisco Bay Area and the San Diego Metro Area. Those three captured 70% of all venture capital investment in 2019. In addition, Boston and San Francisco accounted for 2.7 million square feet and 4.0 million square feet of construction, respectively.

Rounding out the top 10 are Maryland; Raleigh-Durham Metro Area; Philadelphia Metro Area; New York Metro Area; Los Angeles/Orange County; Seattle Metro Area; and New Jersey. New York, Los Angeles and Philadelphia have all moved up the rankings, hitting new highs in venture capital funding and life sciences employment.

"Each cluster has a different specialty and occupies its own point along the maturity spectrum, providing a diverse range of options for investors and occupiers alike," said Roger Humphrey, executive managing director of JLL Life Sciences. "But they do share a major commonality. Each cluster features a highly-educated workforce and ties to the research community, which in turn attracts a steady stream of multi-sourced investment that creates a need for institutional real estate."

The report notes, "Life sciences employment has been steadily growing in the major cluster markets, a positive for innovation potential. However, real estate development occurs on a much slower timeline, and finding space that is appropriately equipped for large-scale research, development and production is crucial to success. For this reason, industry innovation depends on quick and efficient access to Good Manufacturing Practices (GMP)-compliant facilities."

The report also goes into significant depth on each life sciences cluster, including trends in VC funding, life sciences jobs, ownership share and details on what VC firms and life sciences companies are most active in those regions.

For example, they note that in Northern/Central New Jersey, Thor Equities Group acquired a Jersey City site for $95.4 million and is repositioning the 337,890-square-foot former office building for pharmaceutical and life sciences tenants, and that Quest Diagnostics is continuing to build its 250,000-square-foot laboratory at ON3, the former Roche Clifton/Nutley research campus, which will house more than 1,100 employees.

Moderna Launches Phase III COVID-19 Vaccine Trial with $472 Million More in BARDA Funding

Moderna announced that it had expanded its contract with the Biomedical Advanced Research and Development Authority (BARDA) for its mRNA-1273 COVID-19 vaccine. BARDA had earlier awarded the company up to $483 million. They added another $472 million in support of late stage development including the expanded Phase III trial, which also launched today.

After discussions with BARDA and the U.S. Food and Drug Administration (FDA), Moderna chose to run a significantly larger Phase III clinical trial of the vaccine. BARDA is expanding their support of the mRNA-1273 clinical program, including of the 30,000 participant Phase III trial in the U.S. The total grant is now $955 million.

Operation Warp Speed, the Department of Health and Human Services' and the Department of Defense's program to deliver 300 million doses of a COVID-19 vaccine by early 2021, has been investing heavily in promising vaccine programs. On July 22, they invested $1.95 billion in the Pfizer and BioNTech program.

Stéphane Bancel, Moderna's chief executive officer, stated, "We thank BARDA for this continued commitment to mRNA-1273, our vaccine candidate against COVID-19. Encouraged by the Phase I data, we believe that our mRNA vaccine may aid in addressing the COVID-19 pandemic and preventing future outbreaks."

The Phase III COVE (Coronavirus Efficacy) trial launched today, in collaboration with the National Institute of Allergy and Infectious Diseases (NIAID) and BARDA. It is expected to include about 30,000 participants in the U.S., evaluating 100 microgram doses of the vaccine in a randomized, placebo-controlled study. The primary endpoint will be prevention of symptomatic COVID-19 disease. Key secondary endpoints include prevention of severe COVID-19, defined as need for hospitalization, and prevention of SARS-CoV-2 infection regardless of symptoms.

In addition to working with NIAID, BARDA, and NIAID's COVID-19 Prevention Network (CoVPN), it is collaborating with PPD, a global contract research organization. PPD already provided support for the Phase II trial, which enrolled 600 participants at eight research sites within one month. The organization also provided a range of clinical development and laboratory services, including consultation on study design, patient-enrollment epidemiology modeling and biostatistics.

Moderna and partners have chosen almost 100 clinical research sites that represent appropriate demographics, including a diverse population.

Moderna's COVID-19 vaccine, mRNA-1273, is an mRNA vaccine against SARS-CoV-2 that encodes for a prefusion stabilized form of the Spike (S) protein. The Phase III trial, typically the final stage needed for approval for use, will enroll about 30,000 participants in the U.S.

Novartis Launches Initiative to Supply COVID-19 Therapies to Low and Middle-Income Countries

Switzerland's Novartis launched an initiative to assist patients in low-income and lower-middle-income countries in getting access to affordable drugs for COVID-19. Specifically, they are making 15 drugs from its Sandoz division available that can be used to treat symptoms related to COVID-19. They are drugs for gastrointestinal illness, acute respiratory symptoms, pneumonia and septic shock.

Novartis plans to make the drugs available to government, non-governmental organizations (NGOs) and other institutional customers in up to 79 countries at no profit. In addition, the initiative will allow the countries to pick therapies in the portfolio that they need. The primary eligibility requirement is that the countries are on the World Bank's list of low-income and lower-middle-income (LIC; LMIC) countries.

The drugs included in the Novartis COVID-19 Response Portfolio are: Amoxicillin, Ceftriaxone, Clarithromycin, Colchicine, Dexamethasone, Dobutamine, Fluconazole, Heparin, Levofloxacin, Loperamide, Pantoprazole, Prednisone, Prednisolone, Salbutamol and Vancomycin.

The company indicates the portfolio is in addition to the Novartis Access portfolio, which are "on- and off-patent medicines against key non-communicable diseases," by way of the local Novartis or Sandoz affiliate.

To date, Novartis has donated $40 million in support of communities globally impacted by the pandemic. They are also involved in two cross-industry research programs, the COVID-19 Therapeutics Accelerator, coordinated by the Bill & Melinda Gates Foundation, Wellcome Trust, and Mastercard, and a COVID-19 directed partnership organized by the Innovative Medicines Initiative (IMI).

It is still supplying hydroxychloroquine for investigator-initiated clinical trials and when governments require it, as appropriate. It is also supporting clinical trials

of several of its drugs for COVID-19. In addition, AveXis, its gene therapy unit, inked a manufacturing agreement with Massachusetts Eye and Ear and Massachusetts General Hospital to manufacture its novel genetic COVID-19 vaccine candidate, AAVCOVID.

Novavax and SIPL to Develop 1 Billion COVID-19 Vaccine Doses for India, Other Countries

Novavax, Inc. announced its experimental COVID-19 vaccine candidate produced antibodies in healthy patients in a clinical study, the company announced a license agreement with Serum Institute of India Private Limited (SIPL) to develop up to 1 billion doses of the preventative drug in India and other countries.

Gaithersburg, Maryland-based Novavax said the

agreement will allow for the development and distribution of NVX-CoV2373, a recombinant vaccine engineered from the genetic sequence of SARS-CoV-2, in India and in low- and middle-income countries. Those additional countries were not identified in the announcement. Novavax retains the rights to develop its vaccine candidate in upper-middle and high-income countries, the company said. The deal is expected to support the manufacturing of a minimum of 1 billion doses of NVX-CoV2373 for India and low- and middle-income countries.

Under terms of the agreement, SIPL will be responsible for regulatory submissions and marketing authorizations in India and the countries it intends to distribute the vaccine. Novavax will provide SIPL with the vaccine antigen and its proprietary Matrix-M adjuvant. Novavax and SIIPL are in discussions to have SIIPL manufacture vaccine antigen in India.

Stanley C. Erck, president and chief executive officer of Novavax, said the company is committed to ensuring there is a global supply for its COVID-19 vaccine. Erck said he hopes this deal will benefit COVID patients in low-income countries that have been significantly impacted by the pandemic.

As the world's largest vaccine manufacturer in terms of doses delivered, Serum Institute is the ideal partner to advance NVX-CoV2373 throughout India and the LMIC countries.

This agreement complements Novavax's collaboration with the Coalition for Epidemic Preparedness Innovations (CEPI). Through that partnership with CEPI, Novavax committed to develop and manufacture significant amounts of NVX-CoV2373, and, if it proves to be effective, to distribute it equitably through a globally fair allocation framework.

In July, Novavax secured $1.6 billion in U.S. federal funding to support its COVID-19 vaccine development program. The funding came from Operation Warp Speed, the U.S. efforts to quickly develop a vaccine against COVID-19 and provide hundreds of millions of doses to people across the nation. For Novavax, that funding will support late-stage development of its vaccine candidate and will be used to establish large-scale manufacturing in order to deliver 100 million doses of NVX-CoV2373 by the end of the year.

Octapharma Uses IVIG as Potential Treatment for COVID-19

Intravenous immunoglobulin (IVIG) could be a key to combating seriously ill COVID-19 patients who have been hospitalized due to complications from the disease, and Octapharma AG aims to find out as it assesses the plasma-based treatment in a Phase III study.

Huub Kreuwel, vice president of Scientific and Medical Affairs at Octapharma USA, explained that COVID-19-related deaths are typically due to the body's overactive immune response to the disease. The role of IVIG is not to target the virus, but to help calm that overactive immune response by decreasing multiple cytokines at one time. The use of IVIG is more of a blanket approach than Genentech and Regeneron's earlier attempts to calm the cytokine storm by inhibiting interleukin-6 with rheumatoid arthritis drugs.

IVIG contains antibodies that are harvested from plasma provided by thousands of donors across the country. IVIG, which is injected into patients, has been used in the past to help patients fight off various infections, including Kawasaki disease, which is similar to an infection some pediatric COVID-19 patients have developed as a result of the novel coronavirus. IVIG is different than convalescent plasma, which is a therapeutic derived from the patients who have recovered from a COVID-19 infection. The blood of those patients contains antibodies against the disease. Dosing levels are also different. The concentration of IVIG given to patients is much higher than convalescent plasma, Kreuwel said.

Switzerland-based Octapharma teamed with the University of California at San Diego's George Sakoulas, an associate professor in the Department of Pediatrics of the University of California San Diego School of Medicine, to assess the potential impact of IVIG in these patients in a blinded Phase III study. The study, which is currently enrolling, is based upon results Sakoulas saw in a previous pilot study this year using IVIG with COVID-19 patients.

While this approach to treating COVID-19 is different than the use of convalescent plasma, Kreuwel noted that the company is working with several partners in that space as well. Earlier this year, Octapharma launched a special project team to explore new therapies, and today announced that in addition it has also joined other global leaders in plasma fractionation in a collaboration to develop a potential plasma-derived hyperimmune immunoglobulin therapy for treating COVID-19. The strategic alliance include CSL Behring, Takeda, Biotest and others. The consortium is investigating an unbranded anti-SARS-CoV-2 polyclonal hyperimmune immunoglobulin medicine with the potential to treat individuals with serious complications from COVID-19.

In the near future, it is likely that some of the typical IVIG supply used to treat patients will have antibodies to COVID-19 due to the increasing number of cases across the globe, both Kreuwel and Sakoulas said.

That means the approach could help quell potential outbreaks if other treatment options are not available by then.

Roche's Actemra Misses the Mark in Phase III COVID-19 Associated Pneumonia Study

Roche's Actemra failed to meet its primary and secondary endpoints in a late-stage study involving hospitalized patients with severe COVID-19 associated pneumonia. The drug also failed to hit a key secondary endpoint of reduced patient mortality.

Genentech, the South San Francisco-based Roche subsidiary, launched the Phase III COVACTA study of Actemra, a rheumatoid arthritis drug, in March for this indication. The COVACTA study marked the first global study of Actemra (tocilizumab) plus standard-of-care in this setting. Actemra is an IL-6 inhibitor. The IL-6 protein triggers the body's immune and inflammatory response to fight infections. But, in the case of those patients where their immune system overreacts, such as in some COVID-19 patients, inhibiting IL-6 could keep the body from attacking itself.

Genentech announced that COVACTA did not meet its primary endpoint of improved clinical status in hospitalized adult patients with severe COVID-19 associated pneumonia. In addition, the key secondary endpoints, which included the difference in patient mortality at week four, were not met. However, there was a positive trend in time to hospital discharge in patients treated with Actemra, the company said. The median time to discharge for Actemra patients was 20 days, compared to 28 days for placebo patients. Genentech did say, however, that the difference cannot be considered statistically significant as the primary endpoint of the COVACTA study was not met.

The COVACTA study, which was conducted in collaboration with the Biomedical Advanced Research and Development Authority (BARDA), did not identify any new safety signals for Actemra. Further analysis of the trial results is needed to fully understand the data. The results will be submitted for publication in a peer-reviewed journal.

Levi Garraway, chief medical officer and head of Global Product Development for Roche, expressed his disappointment at the trial's failure. As COVID-19, the disease caused by the novel coronavirus, continues to sweep across the globe infecting millions, Garraway said people are waiting for effective treatment options for the disease.

The failure of Actemra in this setting follows the failure of another IL-6 inhibitor in COVID-19. Earlier this month, Regeneron and Sanofi announced that its Phase III study of Kevzara in COVID-19 patients requiring mechanical ventilation did not meet its primary and key secondary endpoints. The trial was stopped following those results, although the companies said they did observe some "minor positive trends" in the primary pre-specified analysis group.

Despite the failure of the Phase III study, Genentech said it remains committed to continuing the Actemra clinical trial program in COVID-19 to further explore Actemra in other treatment settings, including in combination with an antiviral. In addition to CO-

VACTA, Genentech has initiated several studies to further investigate Actemra as a potential treatment for patients with COVID-19 associated pneumonia, including two Phase III clinical trials, REMDACTA and EMPACTA, as well as the Phase II MARIPOSA trial.

Russia Plans Mass COVID-19 Vaccination Program in October but draws criticism

Russia's minister of health, Mikhail Murashko, indicated that the country is planning a nationwide program to vaccinate its population against COVID-19 starting in October. The vaccine has not yet completed clinical trials. Murashko indicated they would begin by vaccinating teachers and health care workers.

Murashko also told the RIA state news agency that while in the middle of accelerated testing, the laboratory that developed the vaccine had already submitted for regulatory approval.

Anthony Fauci, director of the U.S. National Institute of Allergy and Infectious Diseases, told a congressional panel on Friday, "I do hope that the Chinese and the Russians are actually testing the vaccine before they are administering the vaccine to anyone."

In an interview with BlackPressUSA TV, National Newspaper Publishers Association president Benjamin Franklin Chavis Jr., Fauci was also asked about the Russian vaccine. He said, "We could have a vaccine tomorrow, we wouldn't be safe or effective, but we could have a vaccine tomorrow. But we want to prove that it's safe and effective, and that's the reason why we're doing the clinical trials. So anybody could say they have a vaccine and make it, but you have to prove that it's safe and effective. Which I doubt that they've shown that, but you know, we'll see."

Russian state television has been claiming that Russia is leading the competition for a COVID-19 vaccine for several months. In May, the Russian government claimed a Russian researcher had injected himself with a vaccine early in the process.

Kirill Dmitriev, a senior official with Russia Direct Investment Fund, a government-controlled investor in Russia's vaccination effort, indicated a Phase III trial of the vaccine will launch early this month.
The World Health Organization (WHO) has maintained a comprehensive list of vaccine trials around the world, but there is no Russian Phase III trial on

the list, at least not yet.

The New York Times notes that there is very little transparency with the Russian program, so it's difficult to tell if there's any truth to the claims about the trial. And critics have pointed out that Russia has a history of cutting corners in pharmaceutical research and there have been accusations of intellectual property theft. For example, there have been recent accusations of Russian state hackers trying to steal vaccine research. The U.S., Canadian and British governments all made the allegations.

The Russian vaccine product was developed by the Gamaleya Institute in Moscow. According to reports, it leverages two strains of adenovirus, which usually causes mild colds in people. Other programs are also using modified adenoviruses. They are typically genetically modified to infect cells than make those cells manufacture spike proteins of SARS-CoV-2, the novel virus that causes COVID-19.

Reportedly the Gamaleya Institute has tested its vaccine on military personnel. This brings into question ethical questions about consent, although the Russian defense ministry said they all volunteered. The Gamaleya Institute's director, Aleksandr Gintsberg, announced on television in May that he had been dosed by the vaccine before announcing the completion of monkey trials.

Cliff Kupchan, chairman of risk consulting firm Eurasia Group, told The New York Times, "There is an escalation in the geopolitics of vaccine research." But "what remains of the vast scientific complex of the Soviet period is a shadow of what it was."

Dmitriev, however points out that the Soviet Union had one of the most powerful and effective vaccine manufacturing programs in the world, and the reason they are so far ahead is because of that history. "We have this very significant legacy of Russia being a leader of vaccines in the Soviet time and today," he said. "We don't have to create many things from scratch."

Late-stage trials have begun around the world by Moderna, Pfizer and BioNTech, SinoVac in China, SinoPharm in China, and AstraZeneca and the University of Oxford.

Synairgen's Inhaled COVID-19 Treatment Appears to Decrease Disease Risk by 79%

A small biotech company in Southampton, UK, Synairgen, announced positive results from a clinical trial of its wholly-owned inhaled formulation of interferon beta in COVID-19 patients.

The company indicated its nebulizer treatment resulted in a 79% lower risk of patients developing severe disease compared to those receiving a placebo. And the patients receiving the treatment "were more than twice as likely to recover (defined as 'no limitation of activities' or 'no clinical or virological evidence of infection') over the course of the treatment period compared to those receiving placebo."

It's worth noting that the p-value of the 79% figure was

0.046, which only provides a narrow margin for being statistically significant. P-value, or probability value, is a determination of statistical value. The smaller the p-value, the stronger the evidence is that the null hypothesis should be rejected. The null hypothesis is that there is no significant difference between specified populations, and any difference observed is related to sampling or experimental error. A p-value less than 0.05 is statistically significant; greater than 0.05, not statistically significant. Still, it is statistically significant, although barely.

"We are all delighted with the trial results announced today, which showed that SNG001 greatly reduced the number of hospitalized COVID-19 patients who progressed from 'requiring oxygen' to 'requiring ventilation,'" said Richard Marsden, chief executive officer of Synairgen. "It also showed that patients who received SNG001 were at least twice as likely to recover to the point where their everyday activities were not compromised through having been infected by SARS-CoV-2."

The double-blind, placebo-controlled study recruited 101 patients from nine hospital sites in the UK from March 30 to May 27. The cohorts were evenly matched in terms of average age—56.5 years for placebo and 57.8 years for SNG001—as well as comorbidities and average duration of COVID-19 symptoms before enrollment. The average duration of symptoms prior to enrollment was 9.8 days for placebo and 9.6 days for SNG001.

Three patients died after being randomized to placebo, while there were no deaths in patients receiving SNG001.

"We are delighted with the positive data produced from this trial, which is the result of a momentous coordinated effort from Synairgen, the University of Southampton, University Hospital Southampton NHS Foundation Trust and the highly expert research teams across the NIHR network and regulatory bodies in the UK," said Tom Wilkinson, Professor of Respiratory Medicine at the University of Southampton and Trial Chief Investigator. "The results confirm our belief that interferon beta, a widely known drug that, by injection, has been approved for use in a number of other indications, has huge potential as an inhaled drug to be able to restore the lung's immune response, enhancing protection, accelerating recovery and countering the impact of SARA-CoV-2 virus."

Denali and Biogen Ink Parkinson's Pact Worth $2.125 Billion

Biogen and Denali Therapeutics inked a binding deal to co-develop and co-commercialize Denali's small molecule inhibitors of leucine-rich repeat kinase 2 (LRRK2) for Parkinson's disease.

Under the terms of the deal, Biogen is paying Denali $560 million upfront as well as acquiring 13.3 million newly issued shares of Denali stock for a total of about $465.4 million, which is about 11.2% of Denali's pro-forma outstanding stock. In addition, Denali will be eligible for up to $1.125 billion in potential milestone payments.

The two companies will collaborate on Denali's inhibitors of LRRK2 for Parkinson's disease. They will

co-commercialize the product in the U.S. and China, and Biogen will handle all other markets.

The lead compound is DNL151, which is expected to begin Phase III studies in 2021. It is in an ongoing Phase I trial of 162 healthy volunteers, which has completed dosing. It has also completed dosing in 25 Parkinson's patients in a Phase Ib study.

The company is completing more dose-escalating cohorts in an expanded Phase I and an additional cohort in the Phase Ib study to determine the full therapeutic window of the compound. Denali indicates that clinical data generated in Europe has shown the drug to have an acceptable safety and tolerability profile and hit desired target engagement goals.

The TV program is developed to effectively deliver large therapeutic molecules, for example, antibodies, enzymes, proteins and olignonucleotides, across the blood brain barrier after intravenous administration.

"Our collaboration with Denali represents an opportunity to advance the development of a potential first-in-class oral therapy that may slow the progression of Parkinson's disease," said Michel Vounatsos, Biogen's chief executive officer.

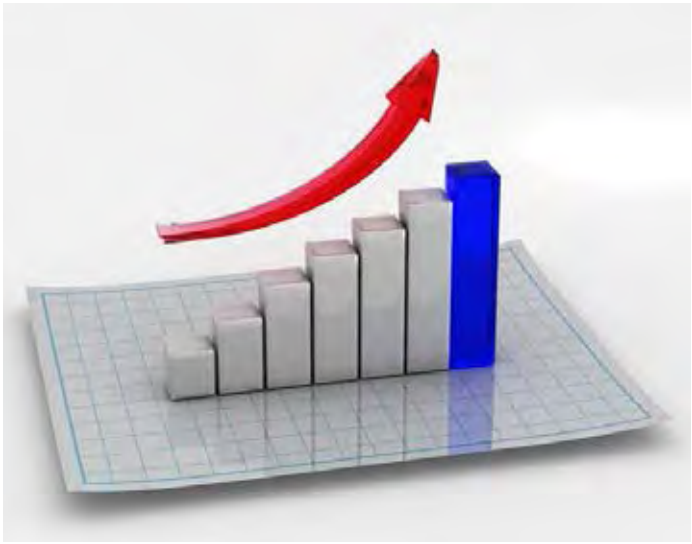
"Denali's LRRK2 program is highly complementary to our existing Parkinson's disease pipeline and its successful development would enhance Biogen's portfolio of medicines for treating serious neurological and neurodegenerative diseases.

We look forward to leveraging our neurology capabilities and infrastructure with Denali's scientific expertise to accelerate advancement of this program."

Germany's CureVac Scores $213 Million in IPO

Aug 14, 2020

The biotech sold 13,333,333 common shares at an initial public offering price of $16 per common share,



which secured a total of $213.3 million. Underwriters have been granted a 30-day option to purchase up to an additional 1,999,999 common shares at the public offering price. For the rest of the investing world, the stock will be available this morning on the Nasdaq Global Market under the ticker symbol "CVAC."

CureVac is exploring the use of messenger RNA (mRNA) technology as a potential treatment for a number of diseases, including cancers and rare diseases. The principle of CureVac's proprietary technology is the use of mRNA as a data carrier to instruct the human body to produce its own proteins capable of fighting a wide range of diseases. Messenger RNA harnesses the genetic code for pathogens and is then inserted into a patient with a goal of producing antigens or proteins that can help the immune system fight off the infection. As of yet, no mRNA drug has been approved.

The Tubingen, Germany-based company said it will use the net proceeds from the IPO, as well as a recent

private placement of cash, to fund a number of different projects, including the continued development of its mRNA COVID-19 vaccine candidate through Phase III, as well as advance its lead oncology program, CV8102, through the completion of the Phase 2 clinical trial. Funds will also be used to advance CureVac's rabies program through Phase II and to advance the development of other preclinical and clinical programs.

CureVac also has a vaccine program, including a candidate for the prevention of COVID-19, the disease caused by the novel coronavirus that has become a global pandemic. In June, CureVac announced the go-ahead to initiate Phase I testing of its mRNA vaccine for COVID-19. The development of that vaccine candidate has been bolstered by a significant investment from the German government, which acquired a 23% stake in the company that same month.

Other News Highlights

FDA Approves NS Pharma's Viltepso for Duchenne Muscular Dystrophy

The U.S. Food and Drug Administration (FDA) approved another therapy for Duchenne muscular dystrophy (DMD), this time NS Pharma's Viltepso (viltolarsen). NS Pharma is a wholly owned subsidiary of Nippon Shinyaku Co.

DMD is a muscle-wasting disease caused by mutations in the dystrophin gene. It is a progressive disease that usually causes death in early adulthood, with serious complications that include heart or respiratory-related problems. It mostly affects boys, about 1 in every 3,500 or 5,000 male children.

"For decades, neurologists who treat DMD have hoped for the discovery of therapies capable of significantly improving dystrophin production, and the magnitude of dystrophin increases observed with Viltepso are impressive," said Vamshi Rao, Ann & Robert H. Lurie Children's Hospital of Chicago, who led the Phase II study the New Drug Application was built on. "The approval of Viltepso is an exciting development for DMD patients amenable to exon 53 skipping therapy and may rapidly become a foundational treatment for these patients."

The Phase II trial was a two-period study in DMD patients aged four to less than 10 years of age conducted in North America, and a multicenter, open-label trial in boys five to less than 18 years of age run in Japan. In Study 1, of the patients who received the recommended dose of 80 mg/kg/wk, 100% showed an increase in dystrophin levels and 88% showed dystrophin levels of 3% or greater than normal. The mean increase in dystrophin expression after 20 to 24 weeks of treatment was almost 6% of normal compared to 0.6% at baseline.

In a statement, the FDA said, "The FDA concluded that the applicant's data demonstrated an increase in dystrophin production that is reasonably likely to predict clinical benefit in patients with DMD who have a confirmed mutation of the dystrophin gene amenable to exon 53 skipping. A clinical benefit of the drug has not been established. In making this decision, the FDA considered the potential risks associated with the drug, the life-threatening and debilitating nature of the disease, and the lack of available therapies."
As part of the accelerated approval process, the FDA is requiring NS Pharma to run a clinical trial to confirm clinical benefit of the drug. It will evaluate whether

the drug improves the time to stand for DMD patients with this particular mutation. If it doesn't show clinical benefit, the agency may withdraw approval.

Common side effects of the drug were upper respiratory tract infection, injection site reaction, cough and fever. Although kidney toxicity wasn't observed, the FDA notes that clinical experience with the drug is limited and kidney function should be monitored in patients receiving Viltepso.

The FDA approved Sarepta's Vyondys 53 (golodirsen) for this same indication and mutation in December 2019. In August 2019, the agency issued a Complete Response Letter (CRL) over the risk of infections at intravenous infusion ports and renal toxicity observed in preclinical models. Sarepta also has another DMD drug, Exondys 51, which is for patients with a confirmed mutation amenable to exon 51 skipping.

uniQure Begins First in Human Gene Therapy Trials for Huntington's Disease

Gene therapy pioneer uniQure launched the first-in-human adeno-associated virus-based gene therapy clinical trial for Huntington's disease. In June, it dosed its first two patients using a novel therapeutic, AMT-130, delivered directly to the brain. Initial readouts are expected in a year's time.

Huntington's disease is a hereditary disease that affects approximately 70,000 people in the U.S. and Europe. It manifests in the loss of muscle coordination, behavioral abnormalities and progressive physical and cognitive decline. The condition is caused by a single genetic mutation that causes the CAG trinucleotide in exon 1 of a multifunctional gene coding the huntingtin protein to expand. As yet, there is no treatment to prevent, delay or ameliorate Huntington's disease.

uniQure used its miQURE™ silencing technology to deliver a therapeutic to suppress the mutant protein and reduce the protein aggregation that contributes to the decline in neuronal function.

AMT-130 uses a non-pathological viral vector to deliver DNA to target cells intraoperatively. For Huntington's disease, the DNA codes for micro RNA that binds to messenger RNA that codes for the mutated protein, degrading it so the messenger RNA can't produce the protein. The therapeutic is delivered directly into deep structures with in the brain – the striatum and putamen, where Huntington's disease manifests – by a catheter the size of a human hair.

uniQure's Phase I/II study is designed for a staggered enrollment of a total of 26 patients. Of the first two patients, Kapusta said, "One received the treatment and the other underwent anesthesia and had a small burr hole made in the scalp and then filled with a bone matrix." In the first cohort of 10 patients, 6 will receive the therapy and 4 will have imitation therapy. After 90 days, a second cohort of 10 patients will receive the treatment and 6 will receive the imitation.

"In mouse models, AMT-130 suggests the ability to restore neuronal function. That was surprising," he said. "That suggests that when aggregation of protein around the neurons is reduced, those neurons can be nursed back to health and their function can be restored." If a neuron dies, however, its function can't be regained. "Animal data suggests that treating patients as early as possible, before atrophy sets in is important."

COVID19 Research

Blood test may point to patients at higher risk for COVID-19 deterioration, death

August 6, 2020

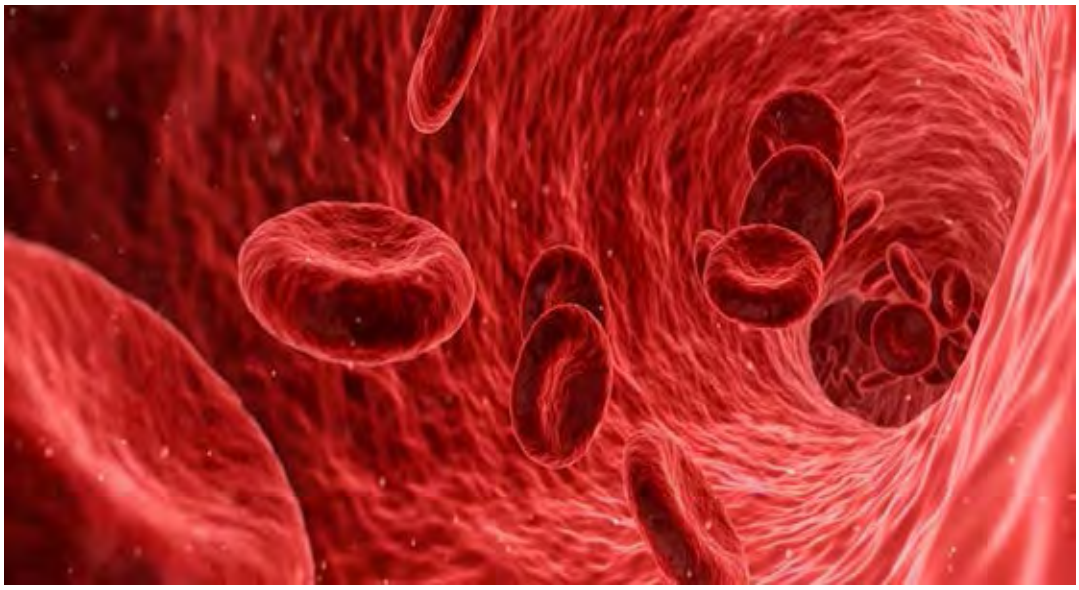
George Washington University (GW) researchers found five biomarkers, medical indicators found in the blood, associated with higher odds of clinical deterioration and death in COVID-19 patients. Published in Future Medicine, these findings will help physicians better predict outcomes for COVID-19 patients in the U.S.

he research team evaluated 299 patients diagnosed with COVID-19 admitted to GW Hospital between March 12 and May 9, 2020. Of these patients, 200 had all five biomarkers being evaluated -- IL-6, D-dimer, CRP, LDH and ferritin. Elevated levels of these biomarkers were associated with inflammation and bleeding disorder, showing an independent increased risk for ICU admission, invasive ventilatory support, and death. The highest odds of death occurred when the LDH level was greater than 1200 units/l and a D-dimer level was greater than 3 ?g/ml.

"We hope these biomarkers help physicians determine how aggressively they need to treat patients, whether a patient should be discharged, and how to monitor patients who are going home, among other clinical decisions," said Shant Ayanian, MD, first author of the study and assistant professor of medicine at the GW School of Medicine and Health Sciences.

Currently, physicians determine risk for COVID-19 deterioration and death based on age and certain underlying medical conditions, like having an immunocompromised state, obesity, and heart disease. Performing a simple blood test for patients admitted to the emergency department, then also making decisions based on biomarkers present, may further aid point-of-care clinical decision making. Reyes, Ayanian, and the GW research team will continue to analyze this data to help physicians make more informed decisions for patients, as well as help hospitals that may need to stratify resources.

Journal Reference:
Shant Ayanian, Juan Reyes, Lei Lynn, Karolyn Teufel.



The association between biomarkers and clinical outcomes in novel coronavirus pneumonia in a US cohort. Biomarkers in Medicine, 2020; DOI: 10.2217/bmm-2020-0309

COVID-19: The longer term effect of COVID-19 recovery

August 6, 2020

Researchers have identified a pattern of longer-term symptoms likely to be experienced by people who were hospitalised with the COVID-19 infection.

They include fatigue, breathlessness, psychological distress -- including problems with concentration and memory -- and a general decline in quality of life.

Some patients, particularly those who had been in intensive care, had symptoms associated with cases of PTSD (post-traumatic stress disorder).

The findings provide the first detailed insight into problems facing patients recovering from COVID-19 in the UK.

Dr Manoj Sivan, Associate Clinical Professor at the University of Leeds and a Consultant in Rehabilitation Medicine at Leeds General Infirmary, supervised the research project. He said: "COVID-19 is a new illness and we have very little information on longer term problems in individuals after discharge from hospital."

"The emerging evidence is that for some, the road to recovery may take months and it is vital specialist rehabilitation is on hand to support them. This research gives an important insight into patient needs, and that will help shape services in the community."

The findings -- Post-discharge symptoms and rehabilitation needs in survivors of COVID-19 infection: a cross-sectional evaluation -- have been published in the Journal of Medical Virology.

The most prevalent symptom was fatigue. More than 60 percent of people who had been treated on a ward reported fatigue, and one-third of them described it as moderate or severe. For patients who had been in intensive care, 72 percent reported fatigue. Of those, more than half said it was moderate or severe.

The second most common symptom was breathlessness. People in both groups said they had feelings of breathlessness which had not existed before they contracted COVID-19. This was higher in the group that had been the most ill, the intensive care group versus those who had been treated in a ward -- 65.6 percent versus 42.6 percent.

The third most prevalent symptoms were neuropsychological. The research survey found that almost one quarter of the people who had been on a ward and just under a half of the people who had been in intensive care had some of the symptoms of PTSD.

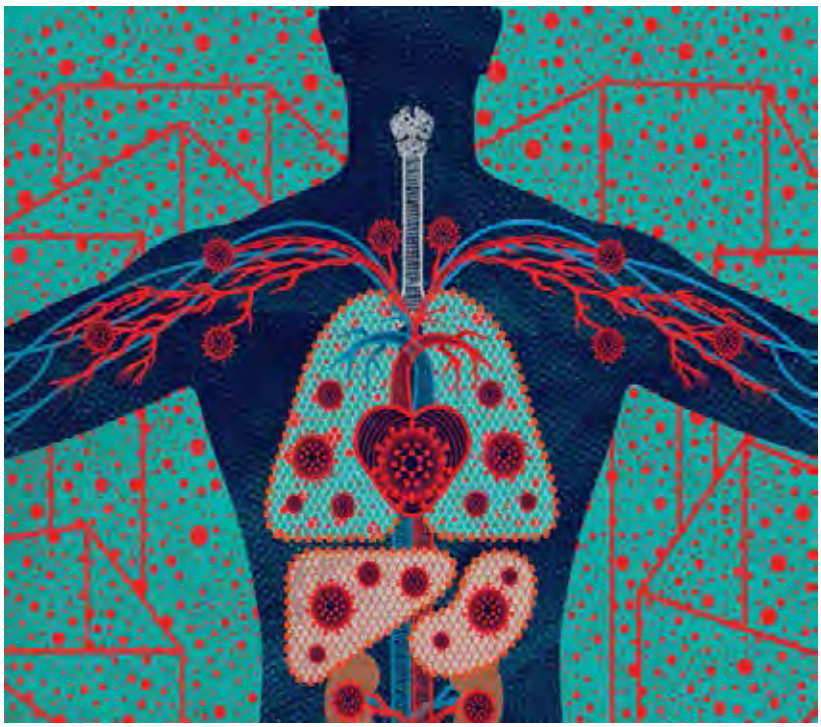
Journal Reference:
Stephen J Halpin, Claire McIvor, Gemma Whyatt, Anastasia Adams, Olivia Harvey, Lyndsay McLean, Christopher Walshaw, Steven Kemp, Joanna Corrado, Rajinder Singh, Tamsin Collins, Rory J O'Connor, Manoj Sivan. Post-discharge symptoms and rehabilitation needs in survivors of COVID-19 infection: a cross-sectional evaluation. Journal of Medical Virology, 2020; DOI: 10.1002/jmv.26368

COVID-19: The virus and the vasculature

August 7, 2020

In severe cases of COVID-19, the infection can lead to obstruction of the blood vessels in the lung, heart and kidneys. Ludwig-Maximilians-Universitaet (LMU) in Munich researchers have now shown that activated immune cells and blood platelets play a major role in these pathologies.

The novel coronavirus SARS-CoV-2 infects the respiratory tract and in severe cases, the infection can result in lung failure, which necessitates the use of mechanical ventilation. In addition, these patients develop further complications, such as pulmonary embolisms or thromboses (clots) in their veins. Whether or not virus-associated respiratory failure is functionally related to the systemic increase in the incidence of intravascular clot formation has remained unclear. However, a new study led by LMU clinicians Leo Nicolai and Konstantin Stark, which appears in the journal Circulation, has identified a link between virus-induced changes in the blood vessels of the lung and the increased thrombotic risk. Upon post-mortem examination of the lungs of COVID-19 patients who had died of the disease, Nicolai and colleagues found many microclots within the finest branches of the pulmonary vasculature. Similar observations were made in the heart and the kidney.



These clots were primarily made up of platelets and activated immune cells, in particular neutrophils. Detailed analysis of the thrombi suggested that an activating interaction between platelets and neutrophils is responsible for promoting intravascular coagulation. Neutrophils belong to the innate immune system and their principal task is to fight invading pathogens. Their involvement in abnormal clotting has led to the designation of this process as immunothrombosis. In COVID-19 patients, the stimulation of clot formation eventually compromises the supply of blood to nearby tissues. This in turn ultimately leads to respiratory failure, while the tendency to trigger clotting becomes systemic.

Using multidimensional flow cytometry assays, the LMU researchers showed that in COVID-19 patients who had suffered lung failure and required mechanical ventilation, the numbers of activated neutrophils and platelets in the circulation were greatly enhanced. Since the two cell types reciprocally activate each other, these interactions lead to the formation of obstructive blood clots in the lung. In addition, activated neutrophils extrude mesh-like complexes made up of DNA and cytoplasmatic proteins, which are known as neutrophil extracellular traps (NETs). These normally serve to trap and destroy bacterial and viral pathogens, but they also play a significant role in immunothrombosis by stabilizing thrombi. While this process is initially localized in the lung exacerbating respiratory failure and result in a systemic thrombogenic state.

Journal Reference:
Leo Nicolai, Alexander Leunig, Sophia Brambs, Rainer Kaiser, Tobias Wein-

berger, Michael Weigand, Maximilian Muenchhoff, Johannes C. Hellmuth, Stephan Ledderose, Heiko Schulz, Clemens Scherer, Martina Rudelius, Michael Zoller, Dominik Höchter, Oliver Keppler, Daniel Teupser, Bernhard Zwißler, Michael Bergwelt-Baildon, Stefan Kääb, Steffen Massberg, Kami Pekayvaz, Konstantin Stark. Immunothrombotic Dysregulation in COVID-19 Pneumonia is Associated with Respiratory Failure and Coagulopathy. Circulation, 2020; DOI: 10.1161/CIRCULATIONAHA.120.048488

Electric cooker an easy, efficient way to sanitize N95 masks, study finds

August 6, 2020

The University of Illinois, Urbana-Champaign study found that 50 minutes of dry heat in an electric cooker, such as a rice cooker or Instant Pot, decontaminated N95 respirators inside and out while maintaining their filtration and fit. This could enable wearers to safely reuse limited supplies of the respirators, originally intended to be one-time-use items.

Led by civil and environmental engineering professors Thanh "Helen" Nguyen and Vishal Verma, the researchers published their findings in the journal Environmental Science and Technology Letters.

The researchers hypothesized that dry heat might be a method to meet all three criteria -- decontamination, filtration and fit -- without requiring special preparation or leaving any chemical residue. They also wanted to find a method that would be widely accessible for people at home. They decided to test an electric cooker, a type of device many people have in their pantries.

They verified that one cooking cycle, which maintains the contents of the cooker at around 100 degrees Celsius or 212 Fahrenheit for 50 minutes, decontaminated the masks, inside and out, from four different classes of virus, including a coronavirus -- and did so more effectively than ultraviolet light. Then, they tested the filtration and fit.

"We built a chamber in my aerosol-testing lab specifically to look at the filtration of the N95 respirators, and measured particles going through it," Verma said. "The respirators maintained their filtration capacity of more than 95% and kept their fit, still properly seated on the wearer's face, even after 20 cycles of decontamination in the electric cooker."

Journal Reference:
Chamteut Oh, Elbashir Araud, Joseph V. Puthussery, Hezi Bai, Gemma G. Clark, Leyi Wang, Vishal Verma, Thanh H. Nguyen. Dry Heat as a Decontamination Method for N95 Respirator Reuse. Environmental Science & Technology Letters, 2020; DOI: 10.1021/acs.estlett.0c00534

Human Trials Begin for COVID-19 Plant-Based Technology Vaccine

Medicago announced that it has administered the first doses of its vaccine against COVID-19 to human volunteers. The results are expected to come out as early as October of this year.

The Quebec City-based company is able to develop a

clinical-grade vaccine candidate in a matter of weeks using plant-based technology. They create their products with virus-like particles (VLP) instead of animal products or live viruses. The VLPs mimic the shape of the virus and allows the human body to recognize them, thus creating an immune response in a non-infectious way.

The Phase I Clinical Trials is a partially blinded study with 180 healthy participants. Three doses, 3.75, 7.5, and 15 micrograms, of the recombinant Corona Virus-Like Particle (CoVLP) vaccine candidate will be evaluated. The doses may be administered with the vaccine candidate alone, or with an adjuvant in a prime-boost regimen. An adjuvant is considered important during a pandemic because it boosts the immune response and reduces the amount of antigen required per dose. This allows the production of more vaccine doses thus maximizing the number of people that can be protected.

The Phase 2/3 Trial is also expected to initiate in October 2020.

Source: Medicago press release

In cell studies, seaweed extract outperforms remdesivir in blocking COVID-19 virus

July 24, 2020

In a test of antiviral effectiveness against the virus that causes COVID-19, an extract from edible seaweeds substantially outperformed remdesivir, the current standard antiviral used to combat the disease. Heparin, a common blood thinner, and a heparin variant stripped of its anticoagulant properties, performed on par with remdesivir in inhibiting SARS-CoV-2 infection in mammalian cells.

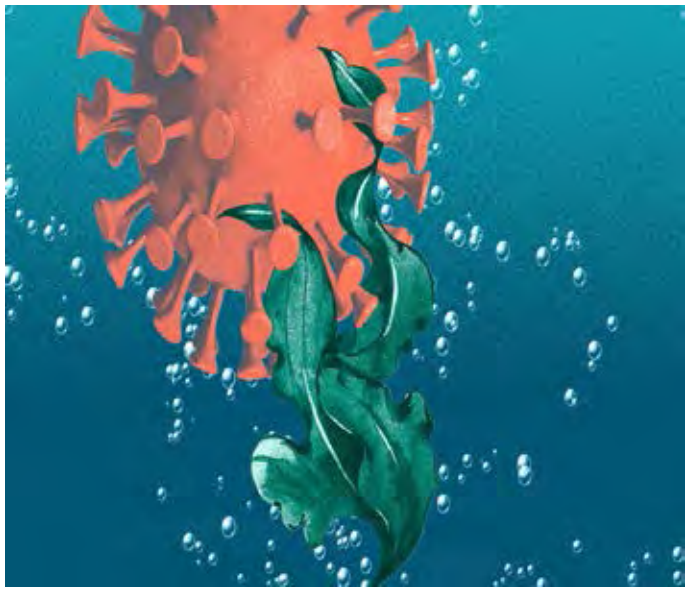
Published online today in Cell Discovery, the research is the latest example of a decoy strategy researchers from the Center for Biotechnology and Interdisciplinary Studies (CBIS) at Rensselear Polytechnic Institute are developing against viruses like the novel coronavirus that spawned the current global health crisis.

Previous research has shown this decoy technique works in trapping other viruses, including dengue, Zika, and influenza A.

The Cell Discovery paper tests antiviral activity in three variants of heparin (heparin, trisulfated heparin, and a non-anticoagulant low molecular weight heparin) and two fucoidans (RPI-27 and RPI-28) extracted from seaweed. All five compounds are long chains of sugar molecules known as sulfated polysaccharides, a structural conformation that the results of a binding study published earlier this month in Antiviral Research suggested as an effective decoy.

The researchers performed a dose response study known as an EC50 -- shorthand for the effective concentration of the compound that inhibits 50% of viral infectivity -- with each of the five compounds on mammalian cells. For the results of an EC50, which are given in a molar concentration, a lower value signals a more potent compound.

RPI-27 yielded an EC50 value of approximately 83



nanomolar, while a similar previously published and independent in vitro test of remdesivir on the same mammalian cells yielded an EC50 of 770 nanomolar. Heparin yielded an EC50 of 2.1 micromolar, or about one-third as active as remdesivir, and a non-anticoagulant analog of heparin yielded an EC50 of 5.0 micromolar, about one-fifth as active as remdesivir.

A separate test found no cellular toxicity in any of the compounds, even at the highest concentrations tested.

"This exciting research by Professors Dordick and Linhardt is among several ongoing research efforts at CBIS, as well as elsewhere at Rensselaer, to tackle the challenges of the COVID-19 pandemic through novel therapeutic approaches and the repurposing of existing drugs," said CBIS Director Deepak Vashishth.

Journal Reference:
Paul S. Kwon, Hanseul Oh, Seok-Joon Kwon, Weihua Jin, Fuming Zhang, Keith Fraser, Jung Joo Hong, Robert J. Linhardt, Jonathan S. Dordick. Sulfated polysaccharides effectively inhibit SARS-CoV-2 in vitro. Cell Discovery, 2020; 6 (1) DOI: 10.1038/s41421-020-00192-8

Lab-made virus mimics COVID-19 virus

July 27, 2020

Researchers at Washington University School of Medicine in St. Louis have developed a hybrid virus that will enable more scientists to enter the fight against the pandemic. The researchers genetically modified a mild virus by swapping one of its genes for one from SARS-CoV-2, the virus that causes COVID-19. The resulting hybrid virus infects cells and is recognized by antibodies just like SARS-CoV-2, but can be handled under ordinary laboratory safety conditions.

To create a model of SARS-CoV-2 that would be safer to handle, Whelan and colleagues -- including co-senior author Michael S. Diamond, MD, PhD, the Herbert S. Gasser Professor of Medicine, and co-first authors Brett Case, PhD, a postdoctoral researcher in Diamond's laboratory, and Paul W. Rothlauf, a graduate student in Whelan's laboratory -- started with vesicular stomatitis virus (VSV). This virus is a workhorse of virology labs because it is fairly innocuous and easy to manipulate genetically. Primarily a virus of cattle, horses and pigs, VSV occasionally infects people, causing a mild flu-like illness that lasts three to five days.

Using serum from COVID-19 survivors and purified antibodies, the researchers showed that the hybrid virus was recognized by antibodies very much like a real SARS-CoV-2 virus that came from a COVID-19 patient. Antibodies or sera that prevented the hybrid virus from infecting cells also blocked the real SARS-CoV-2 virus from doing so; antibodies or sera that failed to stop the hybrid virus also failed to deter the real SARS-CoV-2. In addition, a decoy molecule was equally effective at misdirecting both viruses and preventing them from infecting cells.

The hybrid virus could help scientists evaluate a range of antibody-based preventives and treatments for COVID-19. The virus could be used to assess whether an experimental vaccine elicits neutralizing antibodies, to measure whether a COVID-19 survivor carries enough neutralizing antibodies to donate plasma to COVID-19 patients, or to identify antibodies with the potential to be developed into antiviral drugs.

Journal Reference:
James Brett Case, Paul W. Rothlauf, Rita E. Chen, Zhuoming Liu, Haiyan Zhao, Arthur S. Kim, Louis-Marie Bloyet, Qiru Zeng, Stephen Tahan, Lindsay Droit, Ma. Xenia G. Ilagan, Michael A. Tartell, Gaya Amarasinghe, Jeffrey P. Henderson, Shane Miersch, Mart Ustav, Sachdev Sidhu, Herbert W. Virgin, David Wang, Siyuan Ding, Davide Corti, Elitza S. Theel, David H. Fremont, Michael S. Diamond, Sean P.J. Whelan. Neutralizing antibody and soluble ACE2 inhibition of a replication-competent VSV-SARS-CoV-2 and a clinical isolate of SARS-CoV-2.. Cell Host & Microbe, 2020; DOI: 10.1016/j.chom.2020.06.021

Pasteurization inactivates COVID-19 virus in human milk: new research

A team of medical researchers has found that in human milk, pasteurisation inactivates the virus that causes COVID-19, confirming milk bank processes have been safe throughout the pandemic, and will remain safe going forward, too.

The study -- published this month in the Journal of Paediatrics and Child Health -- was a partnership between UNSW and a multidisciplinary team from Australian Red Cross Lifeblood Milk.

There are five human milk banks in Australia. As the COVID-19 pandemic evolves, these milk banks continue to provide donated breast milk to preterm babies who lack access to their mother's own milk. Donors are screened for diseases, and milk is tested and pasteurised to ensure that it is safe for medically fragile babies.

"While there is no evidence that the virus can be transmitted through breast milk, there is always a theoretical risk," says Greg Walker, lead author and PhD candidate in Professor Bill Rawlinson's group at UNSW Medicine.

"We've seen in previous pandemics that pasteurised donor human milk (PDHM) supplies may be interrupted because of safety considerations, so that's why we wanted to show that PDHM remains safe."

For this study, the team worked in the Kirby Institute's PC3 lab to experimentally infect small amounts of frozen and freshly expressed breast milk from healthy Lifeblood Milk donors.

The researchers also tested if storing SARS-CoV-2 in human milk at 4°C or -30°C would inactivate the virus -- the first time a study has assessed the stability of experimentally infected SARS-CoV-2 in human milk under common storage conditions.

"We found that cold storage did not significantly impact infectious viral load over a 48-hour period," Mr Walker says.

"While freezing the milk resulted in a slight reduction in the virus present, we still recovered viable virus after 48 hours of storage."

Journal Reference:
Gregory J Walker, Vanessa Clifford, Nidhi Bansal, Alberto O Stella, Stuart Turville, Sacha Stelzer-Braid, Laura D Klein, William Rawlinson. SARS-CoV-2 in human milk is inactivated by Holder pasteurisation but not cold storage. Journal of Paediatrics and Child Health, 2020; DOI: 10.1111/jpc.15065

Strong link found between abnormal liver tests and poor COVID-19 outcomes

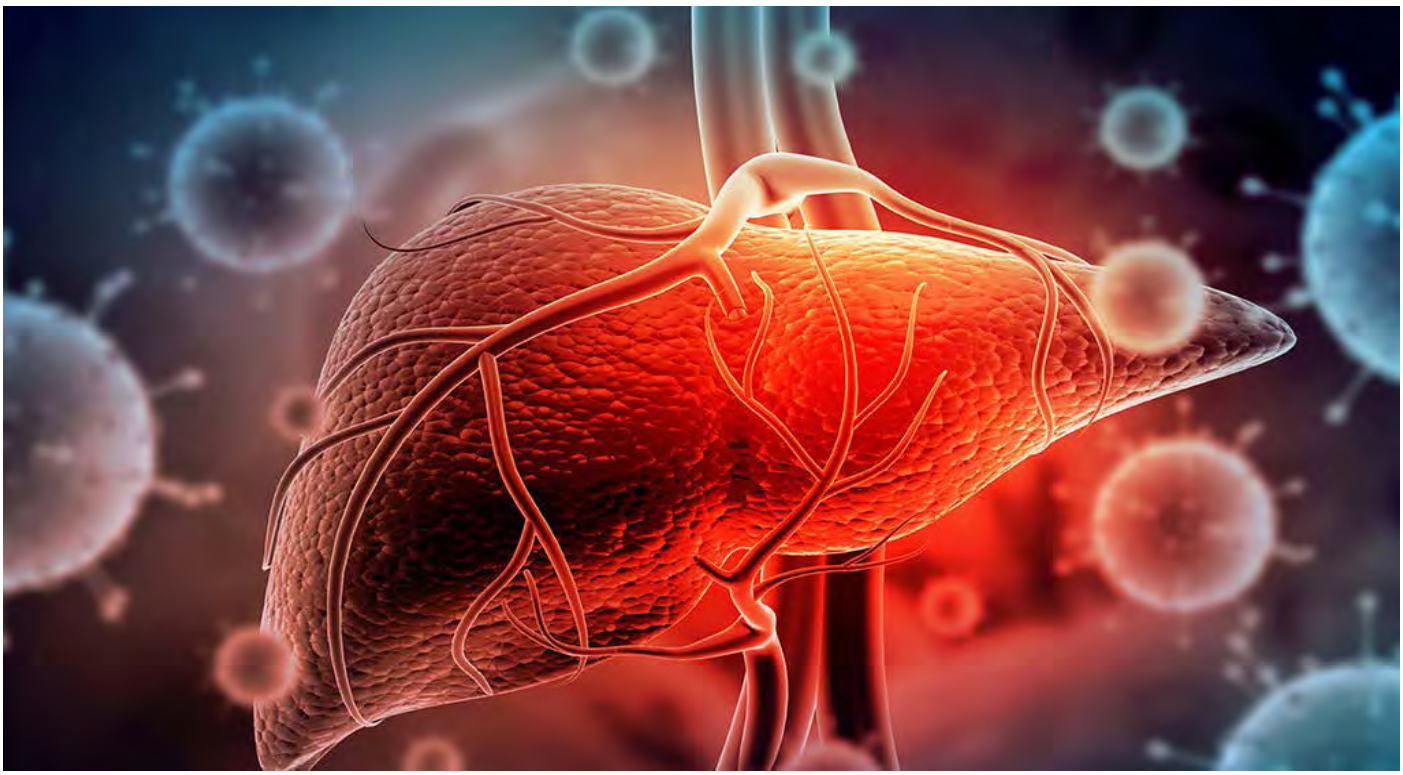
August 7, 2020

Researchers at the Yale Liver Center found that patients with COVID-19 presented with abnormal liver tests at much higher rates than suggested by earlier studies. They also discovered that higher levels of liver enzymes -- proteins released when the liver is damaged -- were associated with poorer outcomes for these patients, including ICU admission, mechanical ventilation, and death.

Previous studies in China found that approximately 15% of patients with COVID-19 had abnormal liver tests. The Yale study, which looked retrospectively at 1,827 COVID-19 patients who were hospitalized in the Yale New Haven Health system between March and April, found that the incidence of abnormal liver tests was much higher -- between 41.6% and 83.4% of patients, depending on the specific test.

In all, the Yale researchers examined five liver tests, looking at factors such as elevations in aspartate aminotransferase (AST) and alanine transaminase (ALT), which indicate liver cell inflammation; an increase in bilirubin, which indicates liver dysfunction; and increased levels of alkaline phosphatase (ALP), which may indicate inflammation of bile ducts.

Although the researchers do not know why the incidence of abnormal liver tests was so much higher than in previous studies from China, senior author Dr. Joseph Lim, professor of medicine and director of the Yale Viral Hepatitis Program, said other health differences between the Chinese and U.S. populations could account for it.



भारतीय आयुर्विज्ञान अनुसंधान परिषद
स्वास्थ्य अनुसंधान विभाग, स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार

Indian Council of Medical Research
Department of Health Research, Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
DIVISION OF EPIDEMIOLOGY AND COMMUNICABLE DISEASES

Call for proposal on Research areas in Leishmaniasis

Visceral leishmaniasis (VL or Kala-azar) is a deadly tropical disease caused by the protozoan parasite genus Leishmania. VL is endemic in >80 countries, however, 90% of the global cases are reported in six countries: Brazil, Ethiopia, India, Somalia, South Sudan, and Sudan. In India, VL is widely prevalent in the 54 districts of four endemic states of India namely Bihar, Jharkhand, Uttar Pradesh and West Bengal.

IMPORTANT TIMELINES
1. Call start date: 14th August 2020
2. Call end date: 15th September 2020 till 5:00 PM

ELIGIBILITY
Individuals holding permanent positions in Medical colleges/Universities, educational and research institutes, NGOs (possessing DSIR certificate).

HOW TO APPLY
Duration of the research proposals should be preferably up to two years. All projects involving research on human beings/animals must be cleared by the Human ethics committee/Animal ethics committee of the respective institute.

Applicants may submit full-length proposal online following ICMR guidelines www.main.icmr.nic.in. To submit a proposal online, please follow the following steps:
1. Go to ICMR website www.main.icmr.nic.in
2. Go to Grants, click on 'Extramural Adhoc', then
3. Click on new user for registration as project investigator (PI). If already registered need not register again
4. Using the user ID and password begin submission of proposal by clicking on advertisement
5. Enter title of the call: 'Call for proposal on Research areas in Leishmaniasis'
6. Click on broad area as ECD, select 'Call for proposal on Research areas in Leishmaniasis' as discipline
7. Major discipline: Leishmaniasis
8. Programme officer: Dr. Manju Rahi, Scientist F, Division of Epidemiology and Communicable Diseases

Department of Biotechnology
Ministry of Science & Technology
Government of India

Call for submission of project proposals under the under the DBT-UMMID Initiative

(Unique Methods of Management of Inherited DisordersInitiative)

Last date for submission of project proposals under the under the DBT-UMMID Initiative has now been extended till 31st August 2020

The Department of Biotechnology, in the next phase of UMMID initiative, is desirous of expansion of the program across the country. Under the present call, the Department invites R&D proposals in the following areas:

1. **Establishment of DBT-NIDAN Kendras**
2. **Screening of pregnant women and newborns in Aspirational Districts**
3. **Establishment of Training Centres on Clinical Genetics**

Eligibility: A Government Medical College / Government Hospital or SIRO recognized not-for-profit Medical College/Hospital desirous of establishing genetic laboratories (NIDAN Kendras) can submit proposals against this call by nominating Clinician(s)/Scientist(s) working in regular capacity with sound relevant clinical/scientific and technical backgrounds and relevant publications as the Principal Investigator. The host hospital/medical college should undertake the overall responsibility of implementing the project and should be willing to provide basic infrastructure including dedicated space and equipments for the establishment of the NIDAN Kendras. **Involvement of all relevant stakeholders is compulsory. Host Institution has to also provide undertaking that once the DBT support is over, host institute will take over the responsibility for continuation of these NIDAN Kendras.**

Mode of Submission: Interested institutions should submit project proposals online by nominating Project Coordinator and Principal Investigator(s)/Co-Principal Investigator(s)/Co- investigator(s) who can submit proposals through DBT electronic project management system 'eProMIS' (http://dbtepromis.nic.in/Login.aspx) under the Programme **'Human Genetics and Genome Analysis'. In addition to submitting the proposal in the R&D project format available on the DBT e-ProMIS portal, the format atAnnexure –I (annexed herewith)should also be also completed, duly endorsed and submitted by uploading on the e-ProMIS portal as a PDF file.**

Please read this advertisement and e-ProMIS user manual carefully before start submitting the proposal in e-ProMIS. For any tehnical issue in eProMIS system, please contact eProMIS administrator in email ID: epromis.dbt@nic.in

Contact for furher information: Dr. Onkar N. Tiwari, Scientist 'E', DBT, New Delhi (Email ID: onkar.dbt@nic.in Tel.: +91-11-24361290) or **Dr. Amit K. Tripathi, Scientist 'C', DBT, New Delhi** (Email ID: amitkr.tripathi@dbt.nic.in)

Last Date for Submission has now been extended upto31stAugust, 2020.

DEPARTMENT OF BIOTECHNOLOGY
Ministry of Science & Technology

DBT ANNOUNCES Fourth Call under ATGC PROGRAM

DBT Invites Proposals under Accelerated Translational Grant for Commercialization (ATGC) Program to Translate Research Leads beyond Early Stage Validation and Encourage Academia to Develop Product/Process/Application

- To Support Proposals aiming for Late Stage Validation
- To Accelerate Translation of Laboratory Research beyond Early Stage Validation
- To Bridge the Innovation Gap through Partnerships and to Provide Support System

Scheme Consists of Two Components:

Academic Lead Translation (ALT)	Academia-Industry Translational Research (AITR)
Academia Independently or in Collaboration with Other Academic Partner (s) or Industry in a Contract Research Mode.	Academia by Involving Industry as Collaborator

Who can Apply?

Academia is required to be the main applicant. Collaborations between Academia-Academia are encouraged for **ALT** and Academia-Industry are required to be applicants for **AITR**.

Industry alone or as a Primary Applicant is not eligible.

How to Apply?

Proposals are required to be submitted **online only** on the DBT ePromis web portal at https://dbtepromis.nic.in/Login.aspx . Only those proposals that are submitted as per the ATGC Proposal format will be considered. For program details and required Technology Readiness Levels (TRLs) PIs are required to visit DBT website at **www.dbtindia.nic.in/ATGC**.

For Queries, Please Contact:	Last Date for Submission of Proposals:
Dr. Sundeep Sarin, Adviser, DBT at sundeep@dbt.nic.in Dr. Sandhya R. Shenoy, Director, DBT, Medical Biotechnology Division at sandhya.shenoy@dbt.nic.in Dr. Varshneya Singh, Scientist-C, DBT at varshneya.singh@dbt.nic.in	**31.08.2020**

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- **Individual Entrepreneur** with Graduate degree in any discipline, Research Scholar, Scientist.
- **Start-up** having a registered company/ LLP incorporated on/after 1st August, 2015.

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Apply Online: http://www.birac.nic.in

Apply Before 15th September 2020 (5:30 PM)

Refer guidelines and FAQs: http://www.birac.nic.in

For additional info, Please Contact: Ms. Taranjeet Kaur | Email: biracbig.dbt@nic.in, sped01@birac.nic.in

Department of Biotechnology
Ministry of Science & Technology
Government of India

CALL FOR PROPOSAL FOR STARTING SKILL VIGYAN PROGRAMME IN PARTNERSHIP WITH DEPARTMENT OF BIOTECHNOLOGY

The Department of Biotechnology, Ministry of Science & Technology is seeking proposals from Indian Institutions for establishment of Skill Vigyan Centres under DBT Skill Vigyan State Partnership Programme in Life Science and Biotechnology.

Programme Activities: The Department of Biotechnology will provide support for following components under DBT Skill Vigyan State Partnership Programme in Life Science and Biotechnology:

1) Students' Training Programme
2) Technician Training Programme
3) Refresher Course/Faculty Training Programme
4) Entrepreneurship Development Training Programme
5) Biotechnology Finishing School Programme

Skill Vigyan Centre: There is no need to create a *de-novo* new centre, existing facilities in universities/institutes could be suitably modified and strengthened to act as a Skill Vigyan Centre. This centre will be expected to impart the quality skill training and enhance the job opportunities in Life Science and Biotechnology sectors.

Who can apply?

- University, Training Institute, Research Institute, State Councils/Organizations with proven track record of conducting teaching/ training programmes in Biotechnology.
- The programme implementing University, Training Institute, Research Institute and State Councils/Organization should have requisite networking and linkages with other academic and research institutions to take advantage of existing expertise.
- The institution should be eligible for receiving Government funds/grants. Evidence of successful (technical and financial) implementation of minimum two projects funded by any Government agency.

How to Apply?

Interested institutions/agencies/organizations should submit the proposal in prescribed format to State Nodal Officer, State Science and Technology Council of respective State on or before 30th July, 2020. The State Nodal Officer will submit the consolidated proposal on or before 30th August, 2020 to Dr. Manoj Singh Rohilla, Scientist-'E' Email: manojsrohilla.dbt@nic.in, Department of Biotechnology, Ministry of Science & Technology, Block-2, Room No. 613, CGO Complex, Lodhi Road, New Delhi -110 003. Please also visit the DBT website www.dbtindia.nic.in for complete information and format for submission of proposal under link 'LatestAnnouncements'.

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International Conference on Biotechnology for Sustainable Agriculture, Environment and Health

XVIIth Convention of BRSI

(BAEH-2020)

ISSN: 2454-6968
RNI No. UPENG/2013/54102

April 4-8, 2021 Jaipur

Details: http://brsi2020jaipur.in/

The event will be jointly organized by the MNIT, Jaipur; CDC India, Jaipur, BISR, Jaipur and NIT-Uttarakhand in association with the International Solid Waste Association (ISWA), The Institute of Chartered Waste Managers (ICWM) and B Lal Institute of Biotechnology, Jaipur. This will be supported by the International Bioprocessing Association, France; Centre for Energy and Environmental Sustainability (CEES)-India and Amity University, Jaipur. The event will be held at BISR, Jaipur. Prof TP Singh, Prof AB Gupta and Dr Vivek Agarwal are conference chairs. Dr V Vivekanand is the convener of BAEH-2020 and Dr P Binod, COE, BRSI; Dr Krishna Mohan, BISR, Jaipur and Dr B Lal, BIB, Jaipur, Dr Rakesh Kumar Mishra, NIT-Uttarakhand are its co-conveners. Details can be found at http://brsi2020jaipur.in/