



News Letter

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Science to Ignite Young Minds and Enlighten the Masses

Technology for Nation's Prosperity

1. Activities Conducted:

1. Webinar talk on **the 9th Dr. Manohar V.N. Shirodkar Memorial Lecture on ‘Innovation in public Health our journey’** was organized on 29th December, 2020 by Telangana Academy of Sciences (TAS), in CSIR-IICT, Hyderabad. **Dr. Krishna M. Ella**, Chairman and Managing Director, Bharat Biotech International Ltd, Hyderabad, delivered the Endowment Lecture. Instituted by Smt. Rajkumari Indira Devi Dhanrajgiri.

DR.M.V.N. SHIRODKAR, M.B.B.S.A.B. (BIOLOGY); D.Sc (VIROLOGY), CONSULTING VIROLOGIST (HON), S.M.R.F., MUMBAI, was born at Mumbai, on Dec 4th 1927, to Smt and Padma Vibhushan late Dr. V. N. Shirodkar, the world- renowned gynecologist and surgeon. Shirodkar who had brilliant academic career was graduated in Biology, at the Johns Hopkins University, U.S.A. He was awarded the “Fifty-year Medallion” of the Johns Hopkins University. Following retirement, as Director of Hopkins Institute, he was appointed Emeritus Medical Scientist, by the ICMR, New Delhi at the National Institute of Virology, Pune. His major contribution is the indigenously discovered antiviral/ anticancer biological, christened as plasma factor. Another model developed by him is that of the Langur monkey infection with hepatitis B virus. He was elected as President, Association of Microbiologists of India in 1983. He was elected as Founding Fellow of the AMI (FAMI).

Dr. Krishna Ella, Chairman and Managing Director, Bharat Biotech International Ltd, graduated with a Ph.D., from the University of Wisconsin-Madison USA, (1987-1992) and returned to India in 1996 to start Bharat Biotech. Bharat Biotech, located in India, primarily focuses on neglected diseases since many neglected diseases turn out to be pandemic diseases. With over 115 patents and having developed more than 16 vaccines, the company has a strong record of producing the highest number of viral vaccines in developing world (11 vaccines), and has supplied more than 9 Billion doses of vaccines in the developing world.

Under Dr. Ella’s leadership, Bharat Biotech successfully developed *Rotavac*®, the developing world’s first vaccine against Rotavirus causing diarrhoeal infections and death. Under his leadership, the company also developed and launched *Typhbar TCV*®, the world’s 1st clinically proven and WHO pre-qualified *Typhoid Conjugate Vaccine* (TCV) and becoming the first company to have proven the efficacy of a Typhoid Conjugate Vaccine through human challenge studies conducted at Oxford University. He was instrumental for receiving over USD 300 million in Grants from the Bill & Melinda Gates Foundation, Wellcome Trust and many Governments for the various clinical programmes. It is also the only company from the developing world to have carried out clinical trials in more than 6,00,000 volunteers in over 8 countries.

In his Dr. M.V.N. Shirodkar Memorial Lecture. Dr. Ella said there were 40,000 unknown viruses and 10,000 zoonotic viruses and there is a need to focus on neglected and unknown diseases that could become global pandemics in future. He assured to take leadership in pandemic problems and neglected diseases,” The public-private partnership model was instrumental in vaccine development, in inspiring research and development, funding and networking, among others.

Bharat Biotech was the world’s first company to file global patents for Chikungunya and Zika Virus vaccines. Most recently, the company has been working on the development of three COVID-19 vaccine

candidates, two of which being international collaborations. The third is an indigenous vaccine development project in collaboration with Indian Council of Medical Research (ICMR). COVAXIN™ is India's 1st indigenous vaccine developed against COVID-19. The vaccine has completed challenge studies in monkeys and hamsters and Phase I & II human clinical trials, and is currently under Phase III efficacy trials in India. The other two vaccines have completed Animal challenge studies and will enter clinical trials by the year end. Bharat Biotech's Covaxin show 'long-term immunity' in phase II trials. A single-dose nasal vaccine is also being developed by the company. Even as there are increasing concerns over new strains of the Covid-19 virus, is vaccine candidate, Covaxin, will be effective in dealing with new strains. Any virus is expected to have a "lot of mutation," and the protein components of inactive Covaxin "will take care of mutations."

Dr. Mohan Rao, Distinguished Scientist, CSIR & former President, TAS, Hyderabad the lecture and appreciated M/S. Bharat Biotech to have developed the vaccine for effective control of Covid-19 at this critical juncture.

2. Honors & Awards:

1. **Prof. T. Satyanarayana**,s name appeared in the ranking list of 2 % Indians, that has been drawn jointly by Elsevier and Stanford University. He stood 260 in Indian science and 580 in the world (based on total citations of the publications).

2. **Dr. Savitri Sharma**,s name figured in Stanford University among **top 2% scientists of the world**. She was ranked 7 among the 10 scientists from India under the discipline of 'Ophthalmology'.

3. **Dr. V. Balaram**,s name was ranked among **Top 2% of the World Scientists** in the list prepared by Stanford University, the US in 2020.

4. **Dr. Ramesh L Gardas**, name as **Associate Editor** since Jan 2021: *Journal of Chemical & Engineering Data*, ACS, **FRSC** (since 2019) :Fellow Royal Society of Chemistry, UK, **FASC** (since 2020) : Fellow of The Academy of Sciences, Chennai, *Journal of Molecular Liquids*, Elsevier, **Editorial Board Member** (since 2020) : *Open Chemistry*, De Gruyter, **Editorial Board Member** (since 2020) : *Molecules*, MDPI, **Featured in the list of "World Ranking of Top 2% Scientists"** : Global Rank #991 in Chemical Engineering with c-score 3.1895 (October 16, 2020; DOI: 10.1371/journal.pbio.3000918), **I&EC Research 2020 Excellence in Review Award – 2020** : Recognized as one among the 35 'notable contributors to I&EC Research' for Excellence in Review Award (2020) by the American Chemical Society Journal – Industrial& Engineering Chemistry Research, **High Impact Author – 2019**: Recognized as one among the 40 'High Impact Author' by the American Chemical Society Journal – Journal of Chemical and Engineering Data.

5. **Prof. Soma Venugopal Rao**, was Nominated as an Editorial Board Member of the Defence Science Journal DESIDOC, DRDO, India. He figured among top 2% of scientists (from India) in the world and field of Optoelectronics & Photonics, Highlighted as one in the top 2% of scientists (from India) in the field of Optoelectronics & Photonics RSC, UK, 2020. Admitted as a FELLOW of the Royal Society of Chemistry, UK in August 2020., Topical Editor, Optics Letters, OSA. Topical Editor of the journal Optics Letters of the Optical Society of America since April 2020.

6. **Prof. M. N. V. Prasad** figured in, list of top 2% all countries from India. Environmental Sciences India rank 1; world rank 116.

7. **Dr. Ranganath Navalgund**,s was conferred by Indian Physics Association "Murali M Chugani Memorial Award" in Applied Physics for the year 2020.

8. U N Das, Consultant Physician & Dialectologist, Clinical Immunologist & Rheumatologist, Founding Editor *Lipids in Health and Disease by BMC Director* Research Centre GVP Medical College and Hospital Visakhapatnam-530048, India. Bio Science is appointed as *Editor-in-Chief*

9. Dr. E V R Rao, released the second edition of the book "A S Rao Scientist . Visionary . Humanist" on 1st November, 2020 to which he is a co-author. The book deals with the life history of "A S Rao founder Managing director of ECIL, and birth and growth of Electronics Corporation India in Hyderabad.

Preventive Strategies for Coronavirus (SARS-CoV-2) Pandemic

Koteswara Rao, V. Associate Fellow of TAS. NCL, PUNE

The smallpox virus was the deadliest and most devastating viral infection in the Indian agricultural communities about 11000 years ago and has been a pandemic in history. In the Influenza pandemic caused by the H1N1 virus in 1918-19, about 500 million peoples were infected around the globe. Surprisingly, the mortality rate was 100 million and is the most calamitous in human pandemic disease history. Severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and human coronaviruses are known causative agents of diseases for various species of animals worldwide. The highly-publicized human coronavirus was discovered in 2003, inducing unique symptoms of SARS such as infections of the lower and upper respiratory tract (LRT/URT). Unlike other viruses, SARS-CoV-2 has a much greater global spread, infecting more individuals than combined infections of MERS and SARS. The SARS-CoV-2 viruses are similar to previous human coronaviruses (HCoV), which are 229E and OC43, SARS-CoV (2013), NL63 (2014), HKU1 (2005), and MERS-CoV (2012). Among seven human SARS-CoV, four strains showing moderate signs of a common cold. Also, HCoV 229E and NL63 are closely related which belong to the genus alpha-coronavirus. However, HCoV OC43, HKU1, and SARS-CoV-2 belong to genera beta-coronavirus. SARS and COVID-19 are respiratory illnesses caused by specific HCoV, but they are caused by a different specific coronavirus. Novel coronavirus (Nov-2019/SARS-nCoV2) was reported in Wuhan, Hubei province in China, in December 2019 marking the beginning of the pandemic caused by this virus. The phylogenetic analysis and nucleotide homology are shown at 79% and 89%, respectively with previous SARS-CoV viruses isolated from bats. Based on this evidence, the new virus was named SARS-CoV-2 by the International Committee for the Taxonomy of Viruses (ICTV). The world health organization (WHO) has declared the Covid-19 epidemic threat as a "very high" level. This highly contagious virus has spread around the globe including 220 countries and territories.

SARS-CoV-2 is a large pleomorphic, spherical particle with a globular projection on the surface. The SARS-CoV-2 has 5'-leader -UTR-replicase /transcript spikes (S), envelope (E), membranes (M), nucleotide (N)-3poly 9A tail, all required to produce a structurally complete viral particle. Till time more than 85.6 million infected individuals and 1.85 million deaths recorded globally till 5 Jan 2020. 10.3 million positive cases and approximately 1.5 deaths are reported in India. SARS-CoV-2 has an error-prone RNA dependent RNA polymerase (RdRp) that incorporates many mutations during replication of viral RNA. A variant of concern 202012/01 (VOC-202012/01 or SARS-CoV-2 VUI 202012/01) or B.1.1.7." is a mutated strain of SARS-CoV-2 was first identified in October 2020 in the United Kingdom from a mouth wash sample and observed as quick transmission in large by mid-December, and become highly prevalent in

London and southeast England. This variant has a mutation in the receptor-binding domain (RBD) of the spike protein at position 501, where amino acid asparagine (N) has been replaced with tyrosine (Y). Based on these mutations, this variant strain has been predicted to be potentially more rapidly transmissible than other circulating strains of SARS-CoV-2.

Detection of the SARS-CoV2: The polymerase chain reaction (PCR) is the basic identification technique using their genetic materials. Currently, real-time Polymerase chain reaction (RT-PCR) is the gold standard for virus detection. Since it has ssRNA as genetic material, the use of RT-PCR for viral detection is favored over the normal PCR as it reduces the conversion step of RNA into cDNA, which must be performed separately in normal PCR. The two-step PCR is time-consuming, as opposed to one-step PCR, and is laborious. Instead of two steps RT-PCR process, several firms have developed one-step RT-PCR in a single tube. Mylab, India developed RT-PCR based COVID-19 diagnostic test kits (RT-PCR), approved by FDA/CDSCO for emergency use authorization (EUA). The RT-PCR technique is widely used to detect the SARS-CoV-2 virus. It is very effective and diagnoses infection at an early stage, but time-consuming, need transportation of samples, require sophisticated Instruments, laboratory setting, up and trained personnel. Massive detection and rapid, fast, inexpensive diagnosis are imperative to overcome the current pandemic problem. Also, expanding the testing strategy for COVID-19 in asymptomatic cases at the hotspot requires large scale testing which is not possible with RT-PCR based testing. A new device, Abbott ID Now COVID-19 test-launched in the United States (US) for the detection of COVID-19 has been approved by FDA on emergency use authentication (EUA) which delivers the fastest results in as little as five minutes. Besides, sensitive Splint-Based One-Step Isothermal RNA Detection (SENSR), Closed-tube Penn-RAMP, and other molecular diagnostic methods for COVID-19 detection such as CRISPR-based SHERLOCK are also being used for the detection of SARS-CoV-2 virus infection in humans. The RT-PCR based diagnosis, rolling circle amplification, nucleic acid hybridization, metagenomic sequencing, lateral flow immunoassays, LMAP, RPA techniques are currently available molecular methods for diagnosis of SARS-CoV-2 infection in humans. Also, Enzyme-linked immunosorbent assay (ELISA). ELISA is used to identify and measure specific peptides, proteins, and antibodies (Ab). Recombinant polyclonal/monoclonal antibodies (pcAb/mAb) are generated against viral structural protein are used for the detection of SARS-CoV-2. Tata CRISPR test, powered by CSIR-IGIB (***Institute of Genomics and Integrative Biology***) FELUDA, developed India's first CRISPR Covid-19 test, developed by the Tata Group and CSIR-IGIB, approved for use in India. It was received regulatory approvals from the Drug Controller General of India (DCGI) for commercial launch, and meeting high-quality benchmarks with 96% sensitivity and 98% specificity for detecting the SARS-CoV-2. Recently, Translational Health Service and Technology institution (THSTI, India) developed DNA aptamer linked immunosorbent assay for rapid detection of novel coronavirus with 90% selectivity and 97% specificity and more are in pipelines.

Drugs and vaccines for Covid-19: Established organizations are maintaining databases of vaccines under development including the World Health Organization (WHO), the Coalition for Epidemic Preparedness Innovations (CEPI), CEPI, the Biomedical Advanced Research and Development Authority (BARDA), GAVI, The Vaccine Alliance strategic alliance ACTIV (Accelerating COVID-19 Therapeutic Interventions and Vaccines), the CDC (Centers for Disease Control and Prevention), FDA (U.S. Food and Drug Administration), and EMA (European Medicines Agency) to develop an international strategy for a coordinated research response to the COVID-19 pandemic. There is a evidence for the probiotic strain that maintain gut microbiota and improve the immune response against SARS-CoV-2 and protect from various respiratory tract infections (RTIs). *Bifidobacterium infantis* *B.animalis*, *Lb. plantarum*, *Lb. casei*, *Lb. paracasei*, *Lb. rhamnosus*, *L. lactis*, *B. subtilis* has demonstrated beneficial effects on the clearance of new devastating SARS-CoV2 human coronavirus and other influenza virus infection from the respiratory tract by enhancing the type I interferons and the antigen-presenting cells, systemic and mucosal specific antibodies in the lungs. Orally administrated *Lactobacillus* strains may easily be transmitted by the gut to the lungs or breast through gut-lung microbial connections. The immune-modulatory effect of probiotics maintains the

equilibrium of pro-inflammatory and regulatory cytokines and prevents viral infections during the minimization of the immune response induced damage in the lungs.

Preventive measures: The most common symptoms of SARS-COVID-19 are dry cough, tiredness and fever. Some less common and potentially suffering patients are loss of smell or taste, pain, sore head, sore throat, stomach discomfort, nasal congestion and, diarrhoea, and skin rash. We are conscious that the first and key important safety function is to maintain at least 1 metre of distance to minimise the risk of infection and to decrease distance. Wear a mask, clean your hands for 20 seconds minimum. Use elbow or tissue to cover the mouth and the nose while coughing or sneezing. Clean and disinfect surfaces frequently especially those which are regularly touched. Stay home and shut-down even after a slight symptoms. Aarogya Setu is the mobile phone application for COVID-19 which was created by the government of India to connect critical health facilities to the population of India in the conflict against COVID-19. Ministry of Health and Family welfare (MoHFW) Government of India and state health bodies micro-monitoring and updating the complete information of SARS-COVID-19. Unless world health organization declare that use should not neglect this mysterious virus. India launched the world's biggest vaccination drive and it shows the world our capability. The Union health ministry urged citizens to keep their guard up and not believe any "rumors about the safety of the vaccines".