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BIOTECH EXPRESS

News of Focus

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- Hydroxychloroquine in Coronavirus pandemic
- NIV Pune Scientists first to deposit gene sequence of coronavirus from the country
- A Wuhan shrimp seller identified as coronavirus 'patient zero'
- China death toll jumps dramatically
- Trump suspends World Health Organization funding
- BCG vaccination COVID-19
- FDA Authorizes Blood
- Purification Device to Treat COVID-19
- world's biggest trial of drug to treat Covid-19 begins in UK

Virology Expert View:

How to Tackle Coronavirus Transmission and Possible Route of Exit from Lockdown

Expert Views: Mental Health

Meet your mental health experts for COVID-19 related stress

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Past present and future

Covid Cure:

Race against COVID19 treatment

Coronavirus2

All you need to know about SARS-CoV2 and COVID19

Impact of COVID
19 on global and
Indian Economy

Why India has gain
advantage over
COVID19 pandemic?

COVID19 Call
For Proposals

ATTENTION!

COVID19



BIOHAZARD

REDUCE YOUR RISK OF **CORONAVIRUS** INFECTION



Clean hands with soap and water or alcohol-based hand rub



Cover nose and mouth when coughing with tissue or flexed elbow



Avoid close contact with anyone with cold or flu-like symptoms

Thoroughly cook meat and eggs



Avoid contact with wild or live farm animals



BIOTECH EXPRESS

The Only Biotechnology News Magazine

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Adapted from the
**World Health
Organization**

**#ProtectYourselfFromCoronavirus
#StayCoronavirusFree #KeepHealthy**

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स्वास्थ्य एवं परिवार कल्याण मंत्रालय
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help you



नोवल कोरोनावायरस (COVID-19)

— खुद रहें सुरक्षित, दूसरों को रखें सुरक्षित —

क्या करें ✓ क्या करें और क्या ना करें



बार-बार हाथ धोएं। जब आपके हाथ स्पष्ट रूप से गंदे न हों, तब भी अपने हाथों को अल्कोहल - आधारित हैंड वॉश या साबुन और पानी से साफ करें



छींकते और खांसते समय, अपना मुंह व नाक टिश्यू/खमाल से ढकें



प्रयोग के तुरंत बाद टिश्यू को किसी बंद डिब्बे में फेंक दें



अगर आपको बुखार, खांसी और सांस लेने में कठिनाई है तो डॉक्टर से संपर्क करें। डॉक्टर से मिलने के दौरान अपने मुंह और नाक को ढकने के लिए मास्क/कपड़े का प्रयोग करें



अगर आप में कोरोना वायरस के लक्षण हैं, तो कृपया राज्य हेल्पलाइन नंबर या स्वास्थ्य मंत्रालय की 24X7 हेल्पलाइन नंबर 011-23978046 पर कॉल करें



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सार्वजनिक स्थानों पर ना धूकें

क्या न करें ✗

हम सब साथ मिलकर कोरोनावायरस से लड़ सकते हैं

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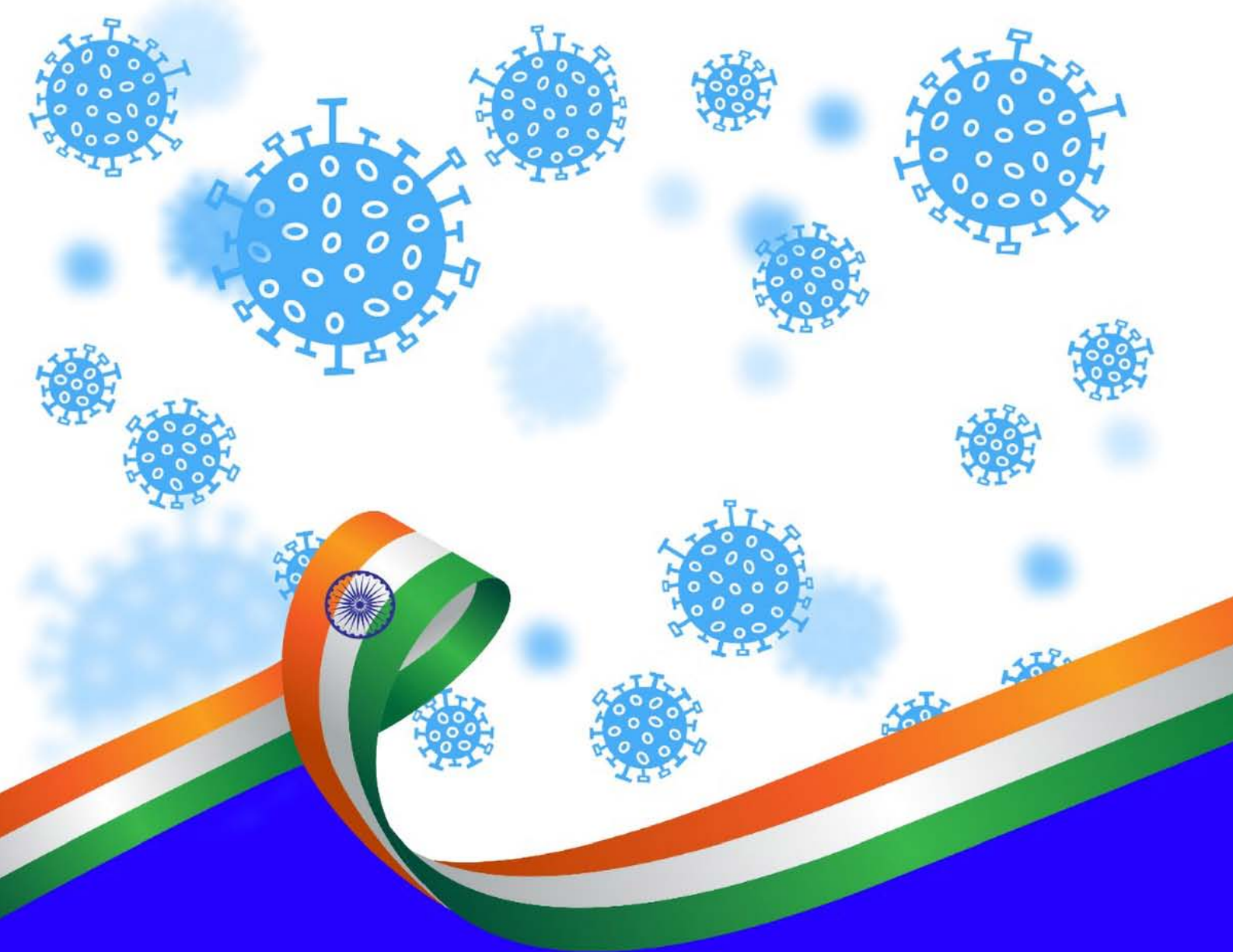
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SCIENCE & TECHNOLOGY EFFORTS IN INDIA ON **COVID-19**



VIGYAN PRASAR

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GOVERNMENT OF INDIA

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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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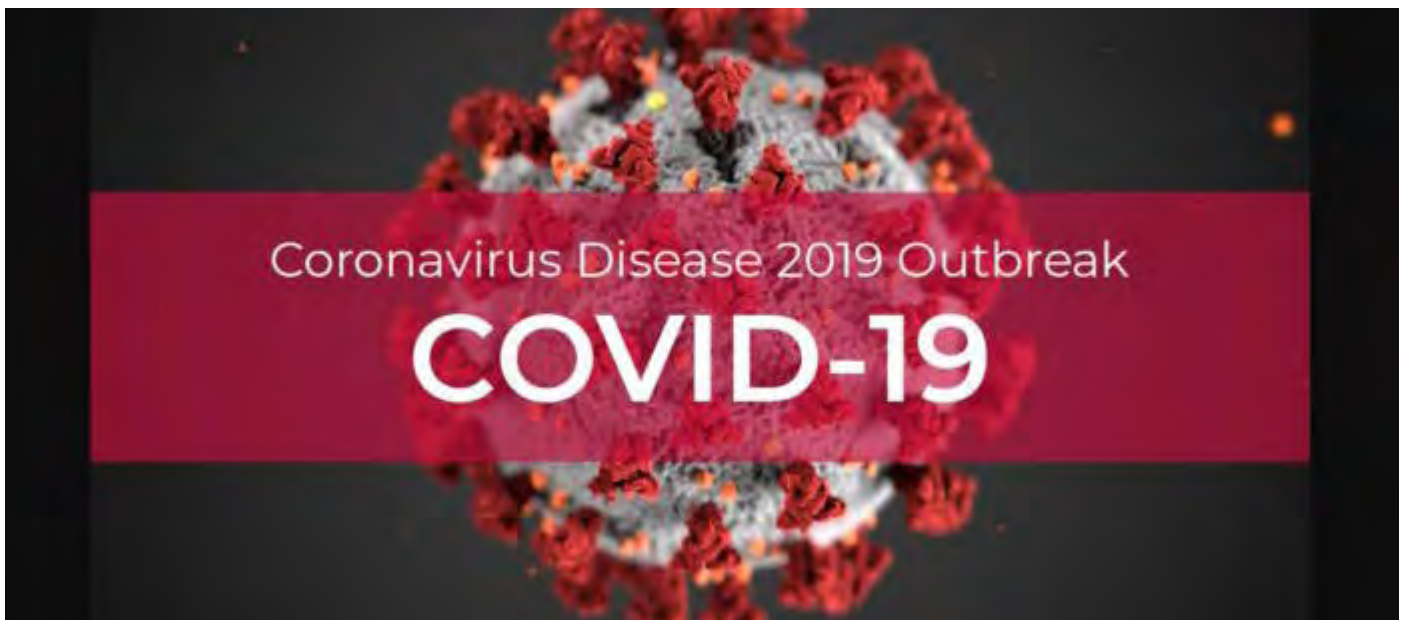
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Editorial

All you need to know about SARS-CoV2 and COVID19 disease

by Kamal Pratap Singh, Managing Editor, Biotech Express

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CoVs : Introduction

Coronaviruses(CoVs) are among a group of related viruses that cause diseases in mammals and birds. There are many diverse groups of viruses and each group contains further more different viruses. Novel Cov2019's story is not very old, a new group of viruses with the name of coronaviruses has been recognized by an informal group of virologists who have sent their conclusions to Nature. In 1975, the International Committee on the Taxonomy of Viruses approved the creation of a new family, Coronaviridae, with one genus, Coronavirus (Tyrrell et al., 1975).

Find out more relevant info: https://www.who.int/health-topics/coronavirus#tab=tab_1

CoVs :Classification

Coronaviruses (CoVs) are the largest group of viruses belonging to the *Nidovirales* order, which includes 4 families *Coronaviridae*, *Arteriviridae*, *Mesoniviridae*, and *Roniviridae*. The *Coronavirinae* Suborder is further subdivided into *Coronaviridae* family, two subfamilies *Letovirinae* and *Orthocoronavirinae* four genera the alpha, beta, gamma, and delta coronaviruses and further into 24 subgenera and 39 species. One of the oldest review on coronavirus which explained about them in detail was published in 1983.

CoVs can infect variety of hosts, those which affects human are of 7 types:

1. 229E (alpha coronavirus)
2. NL63 (alpha coronavirus)
3. OC43 (beta coronavirus)
4. HKU1 (beta coronavirus)
5. MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS)
6. SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS)
7. SARS-CoV-2 (the novel coronavirus that is causing coronavirus disease 2019 or COVID-19, it is attached to beta coronavirus species as we will see in next headings)

People around the world commonly get infected with human coronaviruses 229E, NL63, OC43, and HKU1. Sometimes coronaviruses that infect animals can evolve and make people sick and become a new human coronavirus. Three recent examples of this are SARS2 CoV2019, SARS-CoV, and MERS-CoV.

Find out more relevant info: <https://www.sciencedirect.com/topics/neuroscience/coronavirus>

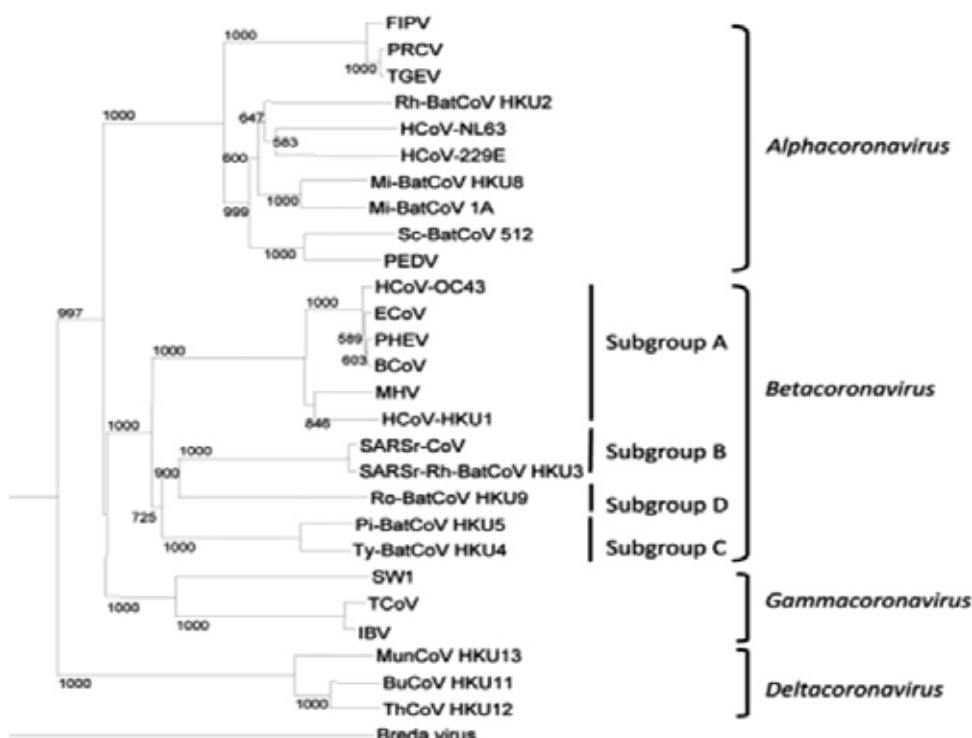
Recognizing CoVs: Identification and naming of novel CoV

CoVs have a crown-like appearance due to the presence of spike glycoproteins on the envelope under an electron microscope (*coronam* is the Latin term for crown). The *Coronaviridae* Study Group (CSG) of the International Committee on Taxonomy of Viruses assessed the placement of the human pathogen which was tentatively named 2019-nCoV, within the *Coronaviridae*. The CSG recognizes this virus as forming a sister clade to the human and bat severe acute respiratory syndrome coronaviruses (SARS-CoVs) and designates it as SARS-CoV-2. They further proposed to use the following naming convention for individual isolates: SARS-CoV-2/host/location/isolate/date.

Find out more relevant info: <https://www.nature.com/articles/s41564-020-0695-z>

Find out more relevant info: <https://www.nature.com/articles/s41564-020-0695-z>

Image: Phylogenetic analysis of RNA-dependent RNA polymerases (Pol) of coronaviruses with complete genome sequences available. (Image source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3185738/>)



CoVs Structure: What they look like?

All viruses in the *Nidovirales* order are enveloped, coronavirus virions are spherical in shape. The coronaviral genome encodes four major structural proteins: the spike (S) protein, nucleocapsid (N) protein, membrane (M) protein, and the envelope (E) protein and many non-structural proteins (NSPs).

Limited information is available toward the complete proteome of SARS-CoV2, the main proteins that are present in CoVs or were studied in SARS2 are:

The **S protein** is ~150 kDa. It utilizes N-terminal signal sequence to gain access to the ER, and is heavily N-linked glycosylated. Homotrimers of the virus encoded S protein make up the distinctive spike structure on the surface of the virus. The trimeric S glycoprotein is a class I fusion protein and mediates attachment to the host receptor.

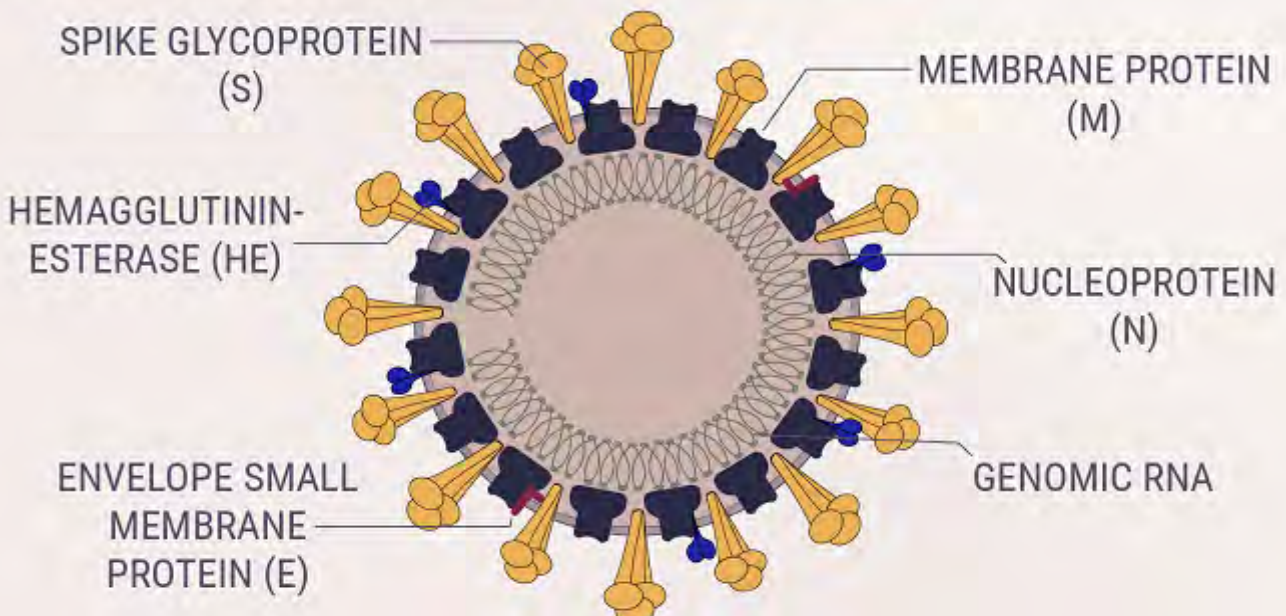
The **N protein** constitutes the only protein present in the nucleocapsid. It is composed of two separate domains, an N-terminal domain (NTD) and a C-terminal domain (CTD), both capable of binding RNA in vitro, but each domain uses different mechanisms to bind RNA. It has been suggested that optimal RNA binding requires contributions from both domains. N protein is also heavily phosphorylated, and phosphorylation has been suggested to trigger a structural change enhancing the affinity for viral versus nonviral RNA.

The **M protein** is the most abundant structural protein in the virion. It is a small (~25–30 kDa) protein with three transmembrane domains and is thought to give the virion its shape. It has a small N-terminal glycosylated ectodomain and a much larger C-terminal endodomain that extends 6–8 nm into the viral particle. Despite being co-translationally inserted in the ER membrane, most M proteins do not contain a signal sequence.

COVID-19

Medscape

The virus associated with the **outbreak originating in Wuhan, China**, has been designated **severe acute respiratory syndrome coronavirus 2 (SARS-CoV2)**. The disease caused by that virus is now officially called **COVID-19**.



The **E protein** (~8–12 kDa) is found in small quantities within the virion. The E protein has an N-terminal ectodomain and a C-terminal endodomain and has ion channel activity. The E protein facilitates assembly and release of the virus, but also has other functions. For instance, the ion channel activity in SARS-CoV E protein is not required for viral replication but is required for pathogenesis.

A fifth structural protein, the hemagglutinin-esterase (HE), is present in a subset of β -coronaviruses. The protein acts as a hemagglutinin, binds sialic acids on surface glycoproteins, and contains acetyl-esterase activity. These activities are thought to enhance S protein-mediated cell entry and virus spread through the mucosa.

Find out more relevant info: <https://www.uniprot.org/proteomes/UP000000354>

Genome: What does it contain for inheritance?

The Genome of SARS - CoV2 is 30 kb long single stranded positive sense RNA which is non-segmented. Positive sense RNA gives mRNA which would incorporate in host polymerase and make protein as quickly as possible.

Analysis of complete viral genome submitted by Indian Scientists at NIV, Pune revealed that it has total 29854 bp in a linear RNA. It has several open reading frames (ORFs) and genes which are in following

order orf1ab -- Gene S -- orf3a -- Gene E -- Gene M -- orf6 -- orf7a -- orf8 -- GeneN -- orf10. Orf1ab is the longest gene in SARS COV2 which spread upto 21.5 kbp.

The main aim of a virus is to enter the host cell, to acquire its genetic machinery and to make progenies which if grows in a suitable atmosphere may reach to billions or even trillions within a fraction of time.

According to a recent study 2019-nCoV was found closely related (with 88% identity) to two bat-derived SARS-like coronaviruses, bat-SL-CoVZC45 and bat-SL-CoVZXC21, collected in 2018 in Zhoushan, eastern China, but were more distant from SARS-CoV (about 79%) and MERS-CoV (about 50%). Phylogenetic analysis revealed that 2019-nCoV fell within the subgenus Sarbecovirus of the genus Betacoronavirus.

Find out more relevant info: https://www.ncbi.nlm.nih.gov/protein/?term=Severe+acute+respiratory+syndrome+coronavirus+2%5Borganism%5D+AND+protein_structure_direct%5B-Filt%5D

CoVs: Transmission

SARS-CoV2 transmits from person to person although according to some theories it came from bat or pangolin which was eaten by a human in Wuhan, China. Between people it can transfer through close contact, aerosol respiratory droplets (coughing or sneezing) and by touch either through body surface of infected surfaces which have virus particles. These

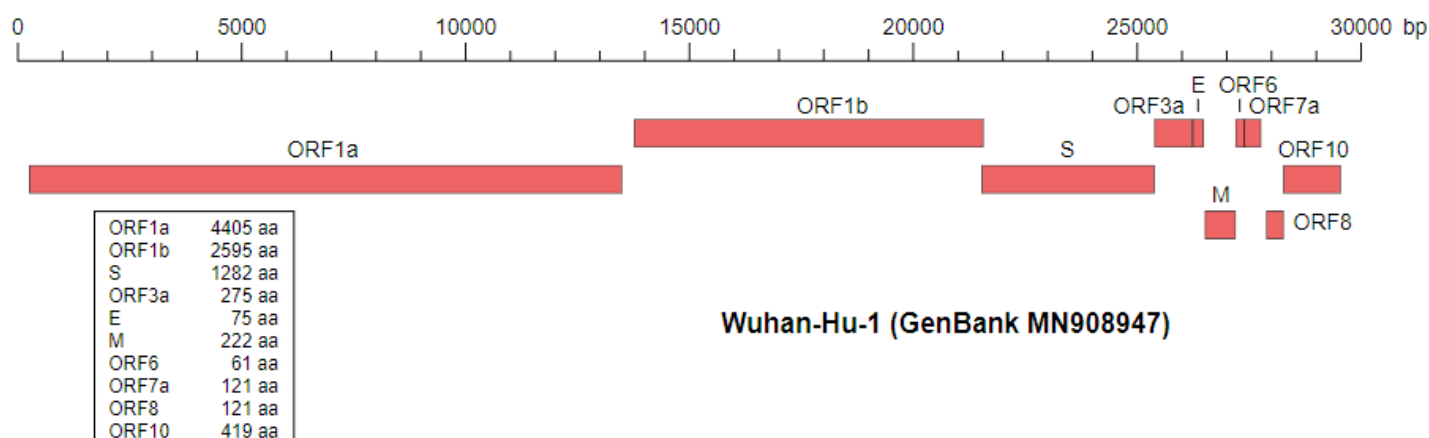
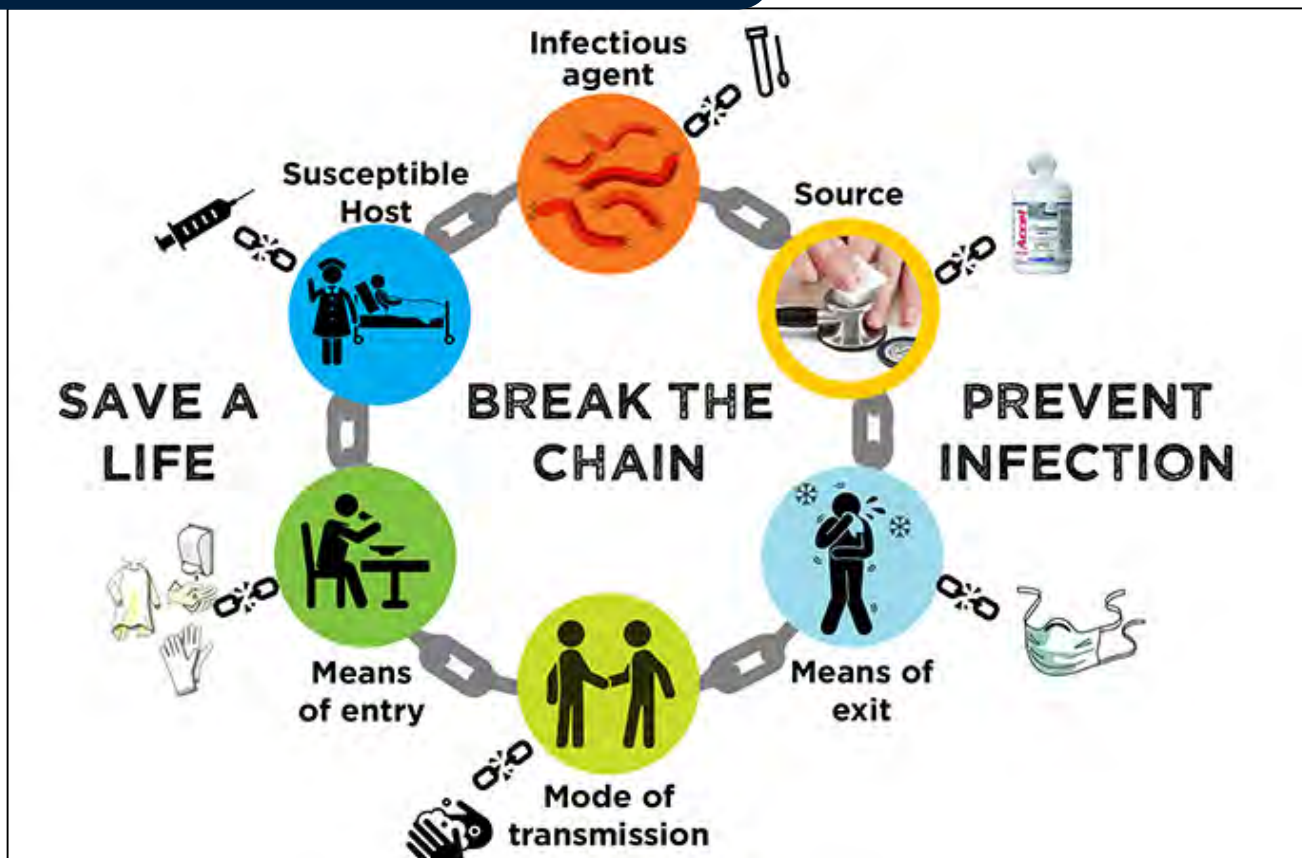


Image: SARS-CoV-2 genome organisation (isolate Wuhan-Hu-1, GenBank Acc MN908947) Source: https://commons.wikimedia.org/wiki/File:SARS-CoV-2_genome.svg



circulating virus particles enter the body through the mouth, eyes or nose.

The initial attachment is initiated by interactions between the S protein (S1 region) and its receptor. ACE2 receptor has been proposed as entry receptor for SARS-CoV2.

Find out more relevant info: <https://www.healthline.com/health/coronavirus-transmission>

CoV: How it harm its Host?

The incubation period for COVID-19 in human (i.e. the time between exposure to the virus and onset of symptoms) is currently estimated to be between one and 14 days. The early symptoms are usually cough, fever and shortness of breath, and look a lot like the flu or common cold. Other like general weakness, fatigue and muscular pain and in the most severe cases, severe pneumonia, acute respiratory distress syndrome, sepsis and septic shock, all potentially leads to death.

Reports show that clinical deterioration can occur rapidly, often during the second week of disease. Recently, anosmia – loss of the sense of smell – (and in some cases the loss of the sense of taste) have been reported as a symptom of a COVID-19 infection.

Find out more relevant info: <https://www.ecdc.europa.eu/en/covid-19/questions-answers>

CoV: How it multiplies?

Following receptor binding, the virus must next gain access to the host cell cytosol. This is generally accomplished by acid dependent proteolytic cleavage of S protein by a cathepsin, TMPRSS2 or another protease, followed by fusion of the viral and cellular membranes. The next step in the coronavirus lifecycle is the translation of the replicase gene from the virion genomic RNA. The replicase gene encodes two large ORFs, rep1a and rep1b, which express two coterminal polyproteins, pp1a and pp1ab. Polyproteins pp1a and pp1ab contain the nsps 1–11 and 1–16, respectively. These polyproteins are subsequently cleaved into the individual nsps. Coronaviruses encode either

two or three proteases that cleave the replicase polyproteins. Many of the nsps assemble into the replicase–transcriptase complex (RTC) to create an environment suitable for RNA synthesis, and ultimately are responsible for RNA replication and transcription of the sub-genomic RNAs.

The nsps also contain other enzyme domains and functions, including those important for RNA replication, for example nsp12 encodes the RNA dependent RNA polymerase (RdRp) domain; nsp13 encodes the RNA helicase domain and RNA 5'-triphosphatase activity; nsp14 encodes the exoribonuclease (ExoN) involved in replication fidelity and N7-methyltransferase activity; and nsp16 encodes 2'-O-methyltransferase activity. In addition to the replication functions other activities, such as blocking innate immune responses (nsp1; nsp16-2'-O-methyl transferase; nsp3-deubiquitinase) have been identified for some of the nsps, while others have largely unknown functions.

Viral RNA synthesis produces both genomic and sub-genomic RNAs. Sub-genomic RNAs serve as mRNAs for the structural and accessory genes. Following replication and sub-genomic RNA synthesis, the viral structural proteins, S, E, and M are translated and inserted into the endoplasmic reticulum (ER).

These proteins move along the secretory pathway into the endoplasmic reticulum–Golgi intermediate compartment (ERGIC). There, viral genomes encapsidated by N protein bud into membranes of the ERGIC containing viral structural proteins, forming mature virions. Following assembly, virions are transported to the cell surface in vesicles and released by exocytosis.

Cov: Diagnostic Tests

When someone feeling ill with COVID-19 symptoms (such as fever, cough, difficulty breathing, muscle pain or general weakness), it is recommended that you contact your local healthcare services online or by telephone (Govt. of India helpline no. is 1075). ECDC has suggested prioritize testing in the following groups:

- hospitalised patients with severe respiratory infections;
- symptomatic healthcare staff including those with mild symptoms;
- cases with acute respiratory infections in hospital or long-term care facilities;
- patients with acute respiratory infections or influenza-like illness in certain outpatient clinics or hospitals;
- elderly people with underlying chronic medical conditions such as lung disease, cancer, heart failure, cerebrovascular disease, renal disease, liver disease, diabetes, and immunocompromising conditions.

The test which is performed to detect virus is Real time Polymerase Chain Reaction (RT-PCR), a molecular test that analyze RNA of virus. Many companies(<https://www.finddx.org/covid-19/pipeline/>) are providing diagnostic kits to test COVID and the protocol can be found on their respective websites.

In India, ICMR - National Institute of Virology Pune has been recognized as WHO reference laboratories providing confirmatory testing for COVID-19.

Find out more relevant info: (https://www.who.int/docs/default-source/coronaviruse/whoinhouseassays.pdf?sfvrsn=de3a76aa_2)



Controlling SARS-CoV2 spread? Prevention is always better than cure

The virus enters your body via your eyes, nose and/or mouth, so it is important to avoid touching your face with unwashed hands. Washing of hands with soap and water for at least 20 seconds, or cleaning hands thoroughly with alcohol-based solutions, gels or tissues is recommended in all settings. It is also recommended to stay 1 metre or more away from people infected with COVID-19 who are showing symptoms, to reduce the risk of infection through respiratory droplets.

CoVs Treatment: Vaccine is for Viruses

There is no specific treatment or vaccine for this disease.

Healthcare providers are mostly using a symptomatic approach, meaning they treat the symptoms rather than target the virus, and provide supportive care (e.g. oxygen therapy, fluid management) for infected persons, which can be highly effective.

As this is a new virus, no vaccine is currently available. Although work on a vaccine has already started by several research groups and pharmaceutical companies worldwide, it may be months to more than a year(s) before a vaccine has been tested and is ready for use in humans.

Origin of Human CoV Pandemic

In 2003 a SARS study group at Queen Mary Hospital, University of Hong Kong analysed case notes and microbiological findings for 50 patients with severe acute respiratory syndrome. They interpreted that a coronavirus which was isolated from patients with SARS might be the primary agent associated with this disease. <https://www.ncbi.nlm.nih.gov/pubmed/12711465>

SCoV-like viruses were isolated from Himalayan palm civets found in a live-animal market in Guangdong,

China. Evidence of virus infection was also detected in other animals (including a raccoon dog, *Nyctereutes procyonoides*) and in humans working at the same market. All the animal isolates retain a 29-nucleotide sequence that is not found in most human isolates. <https://www.ncbi.nlm.nih.gov/pubmed/12958366>

Origin of Human CoV Pandemic

There have been many sceptical theories floating around. There are two main stories that have been put forward to state about the origin of CoV2019. One, as written by vox (<https://www.vox.com/2020/3/4/21156607/how-did-the-corona-virus-get-started-china-wuhan-lab>) the virus was engineered in the lab by humans as a bioweapon or the virus being studied in the lab “escaped” or “leaked” because of poor safety protocol.

But according to Chinese scientists and officials, the source of the SARS2 coronavirus is believed to be a “wet market” in Wuhan which sold both dead and live animals including fish and birds. They (including Lit Man Leo Poon himself) have issued a statement in *The Lancet* as “We stand together to strongly condemn conspiracy theories suggesting that COVID-19 does not have a natural origin, Conspiracy theories do nothing but create fear, rumours, and prejudice that jeopardise our global collaboration in the fight against this virus”.

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30418-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30418-9/fulltext)

Source of the Current CoV Outbreak

Officials from the Chinese Center for Disease Control and Prevention said they have successfully isolated the virus in samples taken from a seafood and wildlife market in Wuhan believed to be the source of the outbreak. Nearly three dozen of the samples taken from the market contained the nucleic acid of the coronavirus, and 31 of those samples were collected from the section of the market dedicated to the sale of wild animals, the Chinese CDC said.

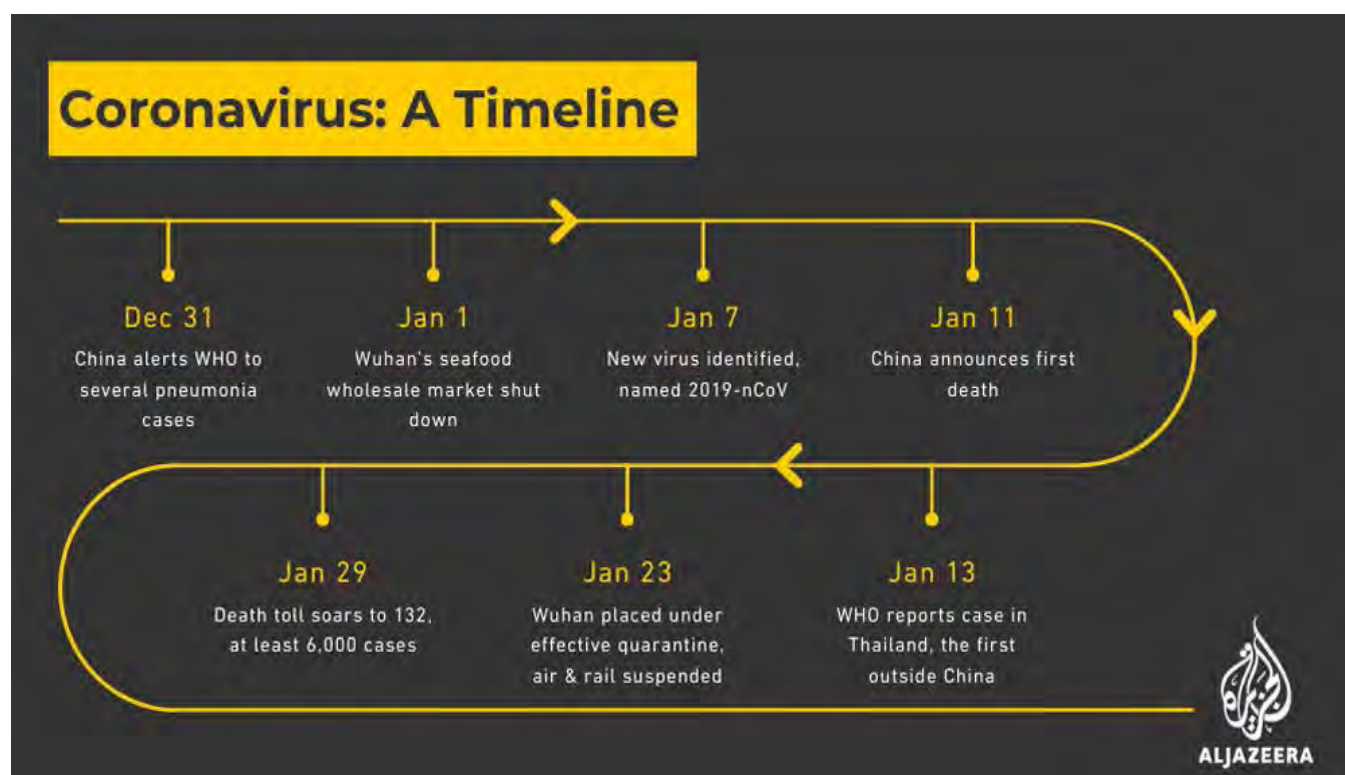
The coronavirus that caused the 2003 SARS outbreak was traced to the civet cat, a wild animal considered a delicacy in parts of South China.

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Author Note: COVID is caused by novel virus which still needs more research therefore this article suggests readers to explore given resources. Any Suggestions/ corrections are welcome.

The article has been highly plagiarised and due references are given.



Expert Views: Virology

How to Tackle Coronavirus Transmission and Possible Route of Exit from Lockdown

By Prof Ramareddy V Guntaka, Professor, Department of Microbiology, Immunology & Biochemistry University of Tennessee, USA.

First of all, about Coronavirus and its severity, this group of viruses contain a very large RNA genome with a complicated life cycle. Ordinarily this group causes seasonal colds in humans and mostly not serious illness. A variant caused severe acute respiratory syndrome (SARS) around 2003 and killed a few thousand people and disappeared. Later MERS emerged from camels in Middle East and killed few hundred people around 2012.

Now we are witnessing the emergence and spread of COVID19. By acting very quickly and prudently Germany, South Korea, India and a few other countries with small number of cases could minimize the impact and saved lives.

We do not know the prevalence of Covid-19 (SARS-CoV-2 or SARS2) but we can fairly control by following these steps which can be understood by taking an example of 550 positive cases. Assuming that (big as-

sumption but a reasonable one) each positive person came in close contact with 20 people, this means that we isolate them and carefully follow their conditions, by monitoring fever, cold and cough and breathing problems, we will know in 2 weeks (or earlier) how many actually developed serious disease. The same can be repeated with new cases that appear day or later and so on. This study with all the accumulated cases over a period of 9 to 10 days will give excellent data on the number of people with no symptoms to mild and serious disease i.e. morbidity and mortality. In my view, this will flatten the curve and will enable us to control the epidemic without making us face grave consequences- lives and business. This will be possible now as we have a less number of infected people.

For any virus to make it a epidemic or pandemic, would usually take about a decade. These viruses, like other RNA viruses, have unusually high rate of mutation, which make them constantly change. Another

About the Expert

Ramareddy V. Guntaka, Ph.D.

Professor, Department of Microbiology, Immunology & Biochemistry
University of Tennessee, Health Sciences Center, Memphis, TN, USA



Major contributions to science:

- Prof Guntaka was one of the four members team that discovered Proto-oncogenes, genes implicated in causing cancer. Two of the members (Bishop & Varmus) received 1989 Nobel Prize for this discovery.
- Prof Guntaka was the first one to molecularly clone the entire genome of Rous Sarcoma Virus, which is being used all over the world as a prototype virus for understanding cancer.
- Prof Guntaka was the key scientist behind the successful development of the Recombinant Hepatitis B Vaccine by Shantha Biotech. This vaccine is now available throughout India at an affordable price to the common man that saved millions of lives from infection by this deadly virus.
- Prof Guntaka was also the key scientist behind the successful development of interferon alpha used to treat hepatitis B infections.
- Prof Guntaka was also the first scientist to clone and study the complete genome of the Indian strains of Hepatitis C virus, a silent killer virus, which already infected more than 30 million people in India. He also successfully produced all the antigens to detect Hepatitis C Virus, Hepatitis B Virus and Human Immunodeficiency Virus (AIDS Virus) infections at Sudershan Biotech in Hyderabad.
- Prof Guntaka is playing a major role in managing Sudershan Biotech Pvt Ltd which is undertaking development of various recombinant therapeutics and currently focusing on an epitope vaccine for Hepatitis C Virus. If successful, this will be first vaccine in the world.

Honors/Awards:

- American Cancer Society Senior Dernham Fellowship, 1973-1975
- Research Career Development Award, National Institutes of Health 1979-1984
- General Motors Cancer Research Professorship, Prague, Czechoslovakia, June 1989
- Siromani Award, America Telugu Association, New York, July 1992
- Scientist Award, Telugu Association of North America, July 1995
- Sir C.V. Raman Professorship, University of Madras, India, January 1996
- N. Narayana Endowment Lecture, Indian Institute of Science, Bangalore, India, 1996
- Member, National Academy of Agricultural Sciences, India,
- Jawaharlal Nehru Professorship, University of Hyderabad, India, August 1998
- Genome Valley Excellence Award, Government of Andhra Pradesh, India. Feb. 2006

important feature of these RNA viruses is formation of defective particles and the more passages they go through in tissue culture or animals, the more defectives accumulate. Since in the present case, Covid-19 (SARS- 2), this mutated virus jumped from animals (Bats) to humans. Initially it might cause a serious disease, like the Covid-19 or a mild disease.

Obviously this virus caused mild or asymptomatic disease in 85% of the individuals, especially the people aged below 50 years. As we get older, the immunity system gets weakened and with other existing conditions, older people succumb to serious illness and consequently death in about 10% of the older patients. Even this virus will get less virulent as it passes from one person to another (especially youngsters), a phenomenon termed attenuation. Rarely the reverse could happen.

Very quickly. SARS2 can be tested by sequencing one or two thousand samples for Receptor Binding Domain. Only about 300 nucleotide region is sufficient which can be done very easily in Indian laboratories. Hundreds of sequencing machines are available in private and University laboratories. These patients can be young or old; comparison would indicate mutations in these populations in this very important region of the Coronaviruses; further they would tell us the differences, if any, among various patients who underwent different course of infection with a different outcome.

The most important now is whether the lockdown at homes should be continued or relaxed in a phased manner, starting as early as possible (one week). Some States are free of any coronavirus cases and more than 60 to 70% of the districts in each State that have no reported cases of coronavirus. They can immediately lift the lockdown orders and let them work or freely move within those confined districts and regions. In other places where they registered some cases, the Governments and Local bodies can let the employees who are under 40 years of age can let them work, since this group is at minimum risk. To minimize infection among them, they still can maintain distance in work places and wear masks if they have to come in close contact with another employee. If any person develop

symptoms, he/she can be quarantined, carefully follow the disease course and treat them in hospital at an early stage.

All the scientific reports clearly indicate that our Ayurvedic medicines, derived from plants like Aswagandha and other plant extracts are effective in reducing the severity of the disease.

From all the information we have so far, the probability of developing a serious outcome may not be high as these people are mostly asymptomatic or go through mild infection. If the disease is progressing to a critical level (about 1 in 200 to 250 infected), they can be treated in the hospital. This way, nobody in this group have to sacrifice their lives. They can also minimize close contact with their elders at home.

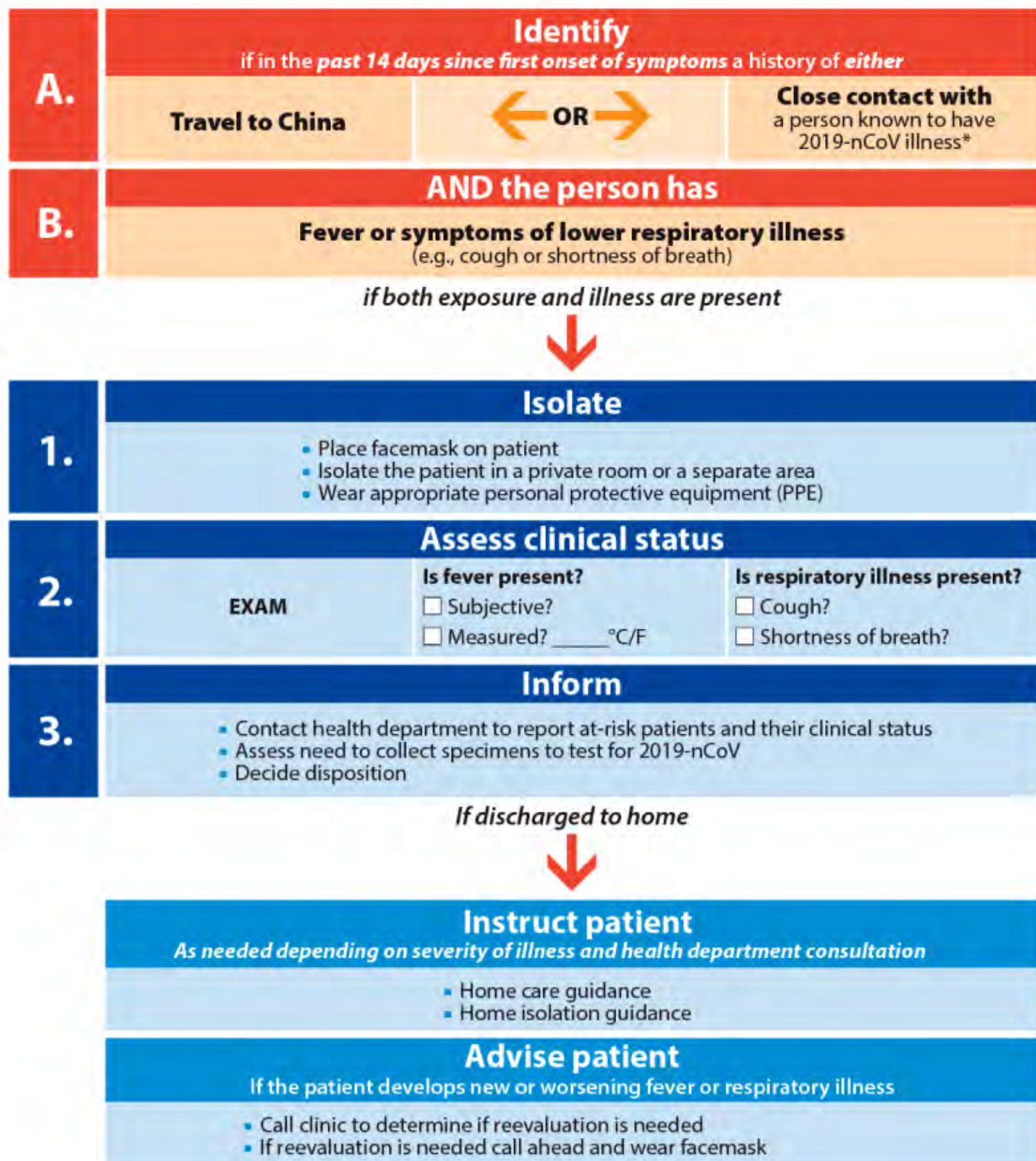
Since most of this age group go to work on motorbikes wearing helmets, they will be protected. On top of it, since it is summer in India, the virus will not survive longer periods. Those who have to use public transportation, buses or trains can take less number of people and make them wear masks. Although uncomfortable, these buses and trains should not use air conditioners.

Depending on the progress, after watching one or two weeks, employees of ages 40 to 55 or 60 can be allowed to return to work, There may be some operational issues in some places like restaurants and downtown offices of big cities. Hopefully, in another month or two everything might come to normal.

Last but not least, people should refrain from watching too much media and social media. Panic and anxiety may worsen the situation and contribute to progress the ailment especially in people with other pre-existing health conditions.

Flowchart to Identify and Assess 2019 Novel Coronavirus

For the evaluation of patients who may be ill with or who may have been exposed to 2019 Novel Coronavirus (2019-nCoV)



* Documentation of laboratory-confirmation of 2019-nCoV may not be possible for travelers or persons caring for patients in other countries. For more clarification on the definition for close contact see CDC's Interim Guidance for Healthcare Professionals: www.cdc.gov/coronavirus/2019-nCoV/hcp/clinical-criteria.html

Editorial

Why India has gain advantage over COVID19 pandemic? A lesson till now

by Kamal Pratap Singh and Vaibhav Sharma(PhD, AIIMS)



India has gain advantage of not becoming a victim of death-air created by Coronavirus named SARS-CoV2 which has swallowed more than 1.5 million lives as on 20th April 2019. According to one website www.worldometers.com the global death rate per million of population is 12.4 as on April 16 ,which means these many people died out of 1 million (10 lakh) people of global population (7.8 billion). Though the virus originated in China it had hurt many countries with severe damage, among worst Italy has most fatalities reaching to 19 thousand, incidence rate of COVID19 has been recorded highest in USA, Spain, France and now spreading to other countries.

The large credit to this success goes to scientific authorities that are close to leaders and/or themselves are leaders like Dr V K Paul (Member, NITI Aayog, a pediatrician by training etc.) and Dr K Vijayraghavan (Principal Scientific Adviser to the Government of India). The team of more than 30 doctors and scientists are working tirelessly as part of two special groups. According to the sources, the first group, constituted on 18 March, is headed by Niti Aayog member Dr V.K. Paul, it has 20 other members. The other group is co-chaired by Dr Paul and PSA to the PM, Dr K. VijayRaghavan, and has nine other members. In this

situation all the team members of these leaders have taken every step very cautiously as it is not an easy task to control 1.3 billion people in their home either Physically or mentally.

Fewer than 600 cases had been confirmed at the time of Modi's announcement but the decision of shutdown at the very early stage of virus spread gave the edge to India when other countries were suffering from disaster or were preparing. The Indian Scientists' decision of "Lockdown A.S.A.P" now has proved to be the best of all strategies against this deadly virus.

India reported its first case of COVID-19 in Kerala,

which rose to three cases by February 3; all were students who had returned from Wuhan, China, later all three recovered. On 4th March a family of 6 patients found positive for CoV, 76 old died due to CoV on 12th March and various cases rose across the country, then govt. of India tried to impose curfew in whole India. The decision was welcome by its citizens and that lead to minimal number of cases.

Surge in number of cases have raised questions like to uplift ban or not and what will be the exit plan. Many cases are arising of conglomerations be it Tablighi Jamaat, Sikh Preacher and recent migration of workers etc.





Govt. called to observe curfew on 21st March and to completely lockdown the unnecessary business on 23rd March 2020. This has proved to be a good strategy to protect world's second most populated country (1.3 billion people) as the rate of infection and death did not surge like that of Italy, Spain France and now USA.

On March 30 the Centre has set up 11 empowered groups for ensuring a comprehensive and integrated response to the Covid-19 pandemic. These groups have been set up under Disaster Management Act. Out of these 11 empowered groups, nine are headed by Secretary-level officers, two by Member, NITI Aayog, and one by the NITI Aayog CEO.

To contain the virus and sustain livelihood several permissions were given in a timely manner for business of basic communities like food and healthcare. At the same time Govt. has advised to ignore outside visit/contact and sometime forcibly tried to impose them under special circumstances.

Financially, India declared several packages to sustain livelihood and to continue economic activity. On 26th March Finance Minister Nirmala Sitharaman announced a relief package of 1.70 lakhs INR or \$23 billion to help fight the Covid-19 outbreak, giving various which include each and every citizen of India that has possible stand in vulnerable situation. . An aid of 17,287 crore was provided to state governments as states seek funds to fight Covid-19 emergency.

Similarly, many ministries who would be helpful for emergencies came forward to help emergency. Ministry of Railways introduced isolation beds inside rail coaches, it made all possible arrangement that would require during emergency transportation either to patients or migrants who have stuck outside their house and are facing crisis.

News media reported for two full days about probable plan of Indian Govt. toward Shutdown. And on 14th April 2020, PM Modi released a statement of extended lockdown till 3rd May and loosening canons from 20th April. However, PM told that this is a decision of all but it had hurt around 94 million Railway ticket holders who in total paid Rs. 1490 crore (<https://www.nationalheraldindia.com/national/railways-to-refund-indian-rupee-1490-crore-for-cancellation-of-94-lakh-ticket-bookings>).

Now call by lockdown2 by many media reporters, has been supported and praised.

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Expert Views: Mental Health

Meet your mental health experts for COVID-19 related stress



The Lockdown and curfew has imposed too much stress on individuals as evident by current few news around the world. This has encouraged us to write a article which would help our readers to understand mental health in current scenario. On directions, after discussing the facts with our Editorial Board Member Dr Rachna Agarwal who is into Neurosciences and is working as Associate Professor in Institute of Human behavior and Allied Sciences (IHBAS) and her peer Dr Om Prakash, we have prepared points which can be considered to understand mental health problems and and to prevent complications associated with it.

The coronavirus pandemic has killed more than 150,000 people, and cases are increasing. The situation is creating anxiety and distress for many as reported by many news report of fighting between family members and suicides. Health experts are now warning our mental health is at stake. And the global health crisis is leading to a loss of sleep, concentration and stress to many. Stress as also highlighted by Prof Ashutosh Sharma, secretary DST is now concern of healthcare professionals.

Based on a dataset created by researchers Thejesh GN, Kanika Sharma and Aman, Indian news website theprint.



About Dr Rachna Agarwal

Dr Rachna Agarwal is Associate Professor in the Department of Neurochemistry in Institute of Human Behaviour & Allied Sciences (IHBAS). She has authored/co-authored more than 37 research publications and several books in the area of Neurosciences. She has been involved in teaching UG and PGs in leading medical colleges of India.



About Dr Om Prakash

Dr. Om Prakash is Psychiatrist by profession and is Associate Professor, Department of Psychiatry in IHBAS. His areas of interest include Schizophrenia, Manic-Depressive Psychosis, Depression, Anxiety, Neurosis and other similar Neurosis and Psycho Somatic Disorders. He is also involved in providing Psychological Counselling and Interventions in Phobias Adjustment Disorders. He is member of many Professional Bodies and Editorial board of Journals.

It is reported that 195 or more people have died of the lockdown. At least 40 people have died or committed suicide after India shut all alcohol stores. Another 39 people have committed suicide because they feared getting the coronavirus infection, thanks to the panic created by the lockdown, or because of loneliness or being quarantined.

On April 14, newindianexpress.com reported about, a 24-year-old migrant worker from the Indian state of Bihar who had committed suicide in Hyderabad after being upset over not being able to go home because of the lockdown. A farmer of U.P "Rambhavan Shukla (52) committed suicide by hanging himself from a tree on the outskirts of Jaari village," Additional Superintendent of Police Lal Bharat Kumar Pal said. According to the family of the deceased, Shukla had been searching for labourers since the past few days, but he could not find any due to the lockdown.

Upset over the increased fights during the lockdown period, a Gurugram resident murdered his wife and committed suicide. According to his daughter, Pramod and his wife Sarita were frustrated over being confined together in house and were constantly quarreling. In continuing cases of tipplers in the southern states ending their lives due to non-availability of liquor during the lockdown, two men committed suicide in Karnataka's Dakshina Kannada district. A Dalit youth committed suicide

on Wednesday after he was allegedly beaten up by the UP police for breaking quarantine rules.

There are still many more suicide and murder stories that could not find place here but all these compel us to think and prevent these deaths and we tried to find answers from Psychiatrists.

According to Psychiatrist Dr Om Prakash, Associate Professor, Institute of Human Behavior and Allied Sciences, mental health problems have always been a curse to patients and survivors during or after a disaster (CoV here). Conditions like Curfew, lockdown etc. may force individuals to adapt which in turn lead to adverse mental health outcomes. He discussed with us how management of psychological behaviour is possible by understanding and handling it with an effective approach.

We are calling CoV attack a disaster because of the casualties it has made; otherwise it is a Public Health emergency that requires immediate attention. Many news and research have been published recognizing "Mental health" as an important factor in the management of a disaster.

History shows that the major health pandemic like The Great Plague of London (which killed 20% of London's population), The Spanish Flu (50 million deaths), Asian

"Anxiety, Distress, Insomnia, hopelessness, loneliness, worry, apprehension, fear, anger, sadness, lethargy – all creep in at some point. News of death of infected further aggravate symptoms of depression."

Flu(1.1 million deaths), 1968 Flu influenza A virus (H3N2) Pandemic (1 million deaths) and 2009 Flu influenza virus, H1N1 Pandemic (201,200 deaths) all have caused Panic and stress among the patients and survivors.

Anxiety and distress disorders become very common and are much difficult to recognize by health care providers. In absence of physical illness, the person might be referred to a psychiatrist or a psychologist who evaluate a person for any stress disorder through specially designed interviews and assessment tools.

Another term 'Disaster Psychiatry' has been of particular use here because of kind of stress CoV is making on society. According to Ann E. Norwood, the term, "disaster psychiatry" describes an epidemiological approach to understand and treat the effects of mass casualty situations.

Before making society a victim of anxiety and distress disorder individuals may take few steps to minimize mental health problems.

In this regard two important reports in this direction are of particular use, first by WHO Department of Mental Health and Substance Use (released on 18th March 2020) and from National Institute of Mental Health and Neuro-Sciences (NIMHANS), Bangalore which discuss most of the causes and effects of psychological issues in detail including case studies of Coronavirus patients.

Both above reports discusses how this time of emergency and lockdown can generate stress throughout the population and how effective measures may possibly down regulate the symptoms of mental disaster in different sections of the society but NIMHANS report is of particular use here as it has discussed each and every aspect of mental health in CoV pandemic.

Since it is not possible to discuss all the recommendations in detail here, combinatorially and briefly, we can pay attention toward following points to maintain healthy mental conditions in a population of 1.3 billion either at times or after CoV crisis.

For General Population

1. Not to link COVID19 to any particular ethnicity or nationality
2. Not to refer people with the disease as "COVID-19 cases", "victims" "COVID-19 families" or "the diseased"

3. Minimize watching, reading or listening news about COVID-19 that may make you anxious or distressed; always try to seek information only from trusted sources
4. To Protect yourself first
5. To give support to others (though social distancing is must)
6. To Find positive and hopeful stories and positive images of people who have experienced COVID-19
7. Honour carers and healthcare workers supporting people

For Mental Health workers

1. To Manage mental health and psychosocial well-being of their own and peers
2. Know how to provide support mental health and psychosocial support to people who are affected by COVID-19 and know how to link them with accurate information and best available resources.
3. Healthcare leaders should keep all staff protected from stress and poor mental health; Orient all responders, including nurses, ambulance drivers, volunteers, case identifiers, teachers and community leaders and workers in quarantine sites, on how to provide basic emotional and practical support to affected people using psychological first aid.
4. Manage urgent mental health and neurological complaints (e.g. delirium, psychosis, severe anxiety or depression) within emergency or general healthcare facilities.
5. Ensure availability of essential, generic psychotropic medications at all levels of health care.

Messages for carers of children

1. Help children find positive ways to express feelings such as fear, anger and sadness.
2. Keep children close to their parents and family
3. Maintain familiar routines in daily life as much as possible, or create new routines.
4. Take care of child's demand because it is common for children to seek more attachment and be more demanding on parents during times of stress and crisis.

Messages for older adults, people with underlying health conditions and their carers

1. Older adults with cognitive decline/dementia, may become more anxious, angry, stressed, agitated and withdrawn during the outbreak or while in quarantine.

2. Share simple facts and give clear information about how to reduce risk of infection in words older people with/without cognitive impairment can understand
3. Make sure to have access to any medications that you are currently using for underlying health condition
4. Be prepared and know in advance where and how to get practical help if needed, like booking a taxi or food and requesting medical care.
5. Learn simple daily physical exercises to perform at home
6. Keep regular routines and schedules

Messages for people in isolation/Quarantine

1. Stay connect and maintain your social networks.
2. Pay attention to your own needs and feelings during stress.
3. Enjoy and relax in healthy activities. Exercise regularly, keep regular sleep routines and eat healthy food.
4. Do not bother about a near-constant stream of news reports about an outbreak as this can cause anyone to feel anxious or distressed.

For families

1. Every individual of family should practice self-care
2. Keep up a routine and maintain discipline
3. Talk to your family members frequently or when needed
4. To limit excessive exposure to media
5. Acknowledge your fear and anxiety, and then find ways to divert your attention
6. Avoid making major life decisions.

For Substance Users

1. To avoid use of tobacco or alcohol or drugs as much as possible
2. Talk to a friend, family member or a professional counsellor
3. To try Intellectual activities like brain games and other video games
4. To try Art therapy like painting, craft etc.
5. To replace substance use, put on patches or use substitutes
6. To find stress moderators like watching reading and listening
7. To practice Self-Hypnosis

Now, all the coping mechanisms that people would nor-

mally use to entertain have been blocked because of the imposition of nationwide curfew and lockdown. 'For example, people used to be able to visit shrines. This would help them psychologically cope with the pressures, or they would visit their friends and relatives and share their troubles... but all this is impossible in the prevailing conditions. Normally, you would feel productive when you go out for a routine work. But now things have changed as people feel helpless and locked up in their homes, fearing for their lives because of cov transmission.

Things are not likely to improve soon, said Dr OM Prakash, 'These symptoms will take at least six months to wear off provided things become normal. Wuhan, China had a lockdown period of 75 days but people are still living in curfew like conditions for their own safety as they fear resurrection of CoV in their city.

Sensing the need many Psychiatric organizations and individuals have started to give attention toward the mental problems in current outbreak and have been trying to give solutions. For example, Indian Psychiatric Society through network of 656 Volunteers/Psychiatrists from all over India is providing online consultation services, the Psychiatric Society of Goa (PSG) has started a service called Covidav to provide free online psychological evaluation and treatment to citizens during the lockdown etc.

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Impact of COVID 19 on global and Indian Economy

by Biotech Express Bureau

If you are interested to find how market projections changed during CoV pandemic then you may see many financial advisors' websites or reports but the aim of this article revolve around the aim to see how a biological agent can hit the economies of many countries including world leaders like America and China.

Success in biological containment of the virus had come at the price of slowing economic activity, no matter whether social distancing and reduced mobility are voluntary or enforced. The coronavirus shock is severe even compared to the Great Financial Crisis of 2007–08, as it is hitting households, businesses, financial institutions, and markets all at the same time—first in China and now globally.

J.P. Morgan Global Economics Research now expects the

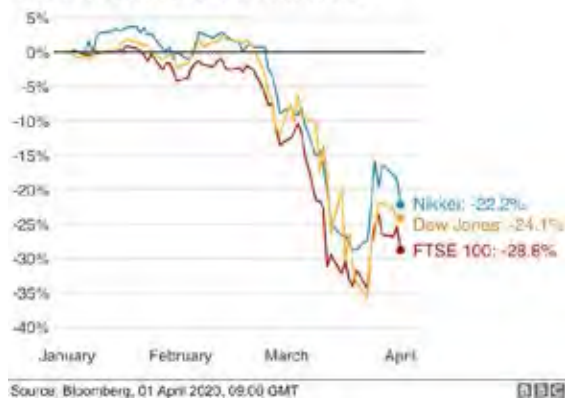
global economy to experience an unprecedented contraction during the first half of the year as containment measures are driving deep collapses in monthly economic activity.

The FTSE, Dow Jones Industrial Average and the Nikkei have all seen huge falls since the outbreak began on 31 December. The Dow and the FTSE recently saw their biggest one day declines since 1987. Similarly many industrial segments have recorded record decline in demand and supply.

The analysis by the UN Department of Economic and Social Affairs (DESA) said the COVID-19 pandemic is disrupting global supply chains and international trade. According to the forecast, lockdowns are hitting the service sector hard, particularly industries that involve physical interactions such as retail trade, leisure and hospitality, recreation and transportation services. The analysis also

warns that the adverse effects of prolonged economic restrictions in developed economies will soon spill over to developing countries via trade and investment channels. A sharp decline in consumer spending in the European Union and the United States will reduce imports of consumer goods from developing countries.

The impact of coronavirus on stock markets since the start of the outbreak



In response, central banks in many countries, including the United Kingdom, have slashed interest rates. Global markets did also recover some ground after the US Senate passed a \$2 trillion (£1.7tn) coronavirus aid bill to help workers and businesses.

Industries that were hit hard due to this biological calamity

The Hospitality industry hotel, restaurant industry has been badly damaged, with airlines cutting flights and tourists cancelling business trips and holidays. All means of

public transport like airbus, rail, buses, autos and even rickshaws have been banned on their tracks. This not only affected the drivers but also the families who were looking to welcome the passengers they are bringing in their tourist city. Governments around the world have introduced travel restrictions to try to contain the virus.

There is a long list of other industries that have suffered a lot after Coronavirus attack. The list include Education, Sports & Entertainment, Hyperlocal Marketplaces, Retail & e-Commerce, Fintech, Textile and Apparel, Consumer Durables and Electronics, Poultry and Seafood, Movie theatres, Fitness centers, Commercial real estate, Shipping, Automakers, Oil and gas, Conventions, Online Food service, Theme parks etc.

Since there are many industries that have been put in a dormancy state it is noteworthy to discuss the industries that are kept in a list of essential commodity and are open.

The first priority has been granted for food and health sector, including their upstream/downstream partners. Second priority was given to online marketplaces that are providing essential commodities like supermarkets and online delivery services have reported a huge growth in demand as customers stockpile goods such as toilet paper, rice and orange juice as the pandemic escalated.

Since the number of covid19 cases did not surge to extreme, Indian Govt on 17th April i.e. after 25 days of lockdown allowed few industrial activities to resume/boost India's financial position.

Industries open during lockdown 2.0 India

- All kinds of essential include all health workers -- doctors, nurses, hospital staff, and sanitation workers.
- All kind of Agriculture activities and its production and supply chain.
- Online Educational activities.
- Media persons belonging to print and electronic media but not in hotspots.
- Homes of children, disabled, mentally challenged or senior citizens, women
- Movement, loading or unloading of goods cargo -- both inter or intrastate
- MNREGA works are allowed with strict implementation of social distancing and use of face mask.
- Hotels, homestays, lodges and motels, which are ac-

India has not yet taken a decision on when to lift or ease restrictions on domestic and international flights and urged airlines to take travel bookings only after a final decision is made, a government minister said. (Reuters, April 19)



About 144 million people travelled on domestic flights (India) last year.

commodating tourists and persons stranded due to lockdown, medical and emergency staff, air and sea crew

- Services provided by self-employed people, including electrician, IT repairs, plumbers, motor mechanics and carpenters
- Industries in rural areas, SEZs, and EOU zones, units making essential goods, food processing units, IT hardware companies, coal production will be allowed to function.
- Construction of roads, irrigation projects, buildings and all kinds of industrial projects, including MSMEs, in rural areas and construction of renewable energy projects will be allowed.
- The government will also ease restrictions for farm-workers since the rabi crop harvest season has started in states like Punjab, Haryana and Uttar Pradesh. This include Shops of agriculture machinery, its spare parts (including its supply chain) and repairs to remain open.
- All security personnel, including police and security forces, are also exempted from the lockdown.
- All kinds of essential service agencies, including cook gas agencies, fuel pumps, ration shops, wholesale and retail shops and vegetable mandis, will remain open.
- Pathology labs will also be allowed to operate amid the lockdown. Notably, the government has also roped in various private labs to conduct COVID-19 tests.
- All Goods traffic like Goods trucks carrying goods -- weather or not essential goods -- within states and outside states will be allowed to operate during the extended lockdown period.
- People in areas not identified as containment zones are allowed to go out to buy essential items like ration, vegetables, milk, etc.
- IT services for essential services, internet and telecommunication services will also remain open.
- Postal Services.
- Delivery of all essential goods including food, pharmaceuticals, medical equipment through E-commerce.
- Capital and debt market services as notified by the Securities and Exchange Board of India.

- Cold storage and warehousing services.
- Data and call centers for Government activities only.
- All other establishments may work-from-home only.

Sectors still closed after lockdown 2.0 India

- All domestic and international air travel for the general public; all passenger trains; bus transport; and metro rail services will remain closed.
- Taxis, including auto-rickshaws and cycle rickshaws, and services of cab aggregators will not operate during the extended lockdown.
- All social, political, sports, entertainment, academic, cultural and religious activities also stand suspended.
- All religious places of worship will be closed for public during the lockdown. In the case of funerals, the congregation of more than 20 persons will not be permitted.
- To mitigate hardship, select additional activities have been allowed from April 20. However, states or UTs will separately take the final call on the relaxation of curbs. PM Modi on Tuesday had also said that areas with no coronavirus cases could be exempted some restrictions from April 20.
- All education institutes will remain shut.
- All social, political, sports, cultural, academic, entertainment and religious gatherings are prohibited.

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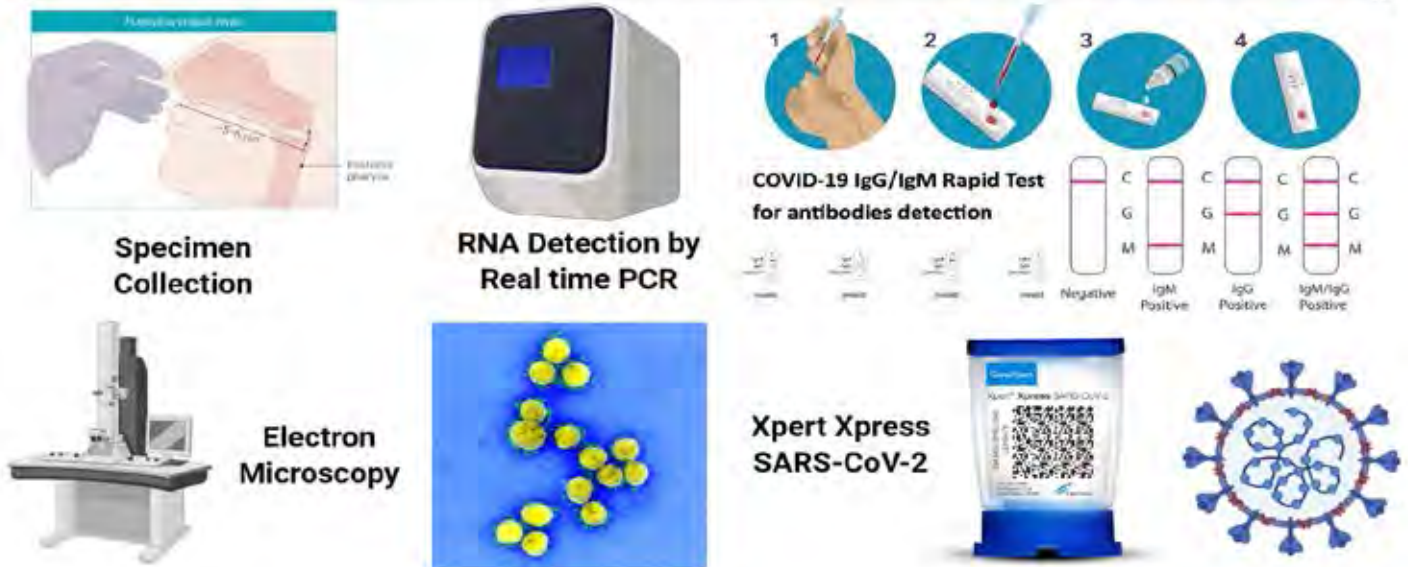
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Analysis

COVID19 Diagnosis: Past present and future

by Biotech Express Bureau

Sample Collection and Diagnosis of COVID-19



Current molecular methods to detect infections of the novel coronavirus rely on identifying particular genetic sequences (Nucleic acid amplification tests) of SARS-CoV2, but new assays are being developed to meet the growing demand for rapid answers.

The quick sequencing of the SARS-CoV-2 genome and distribution of the data early on in the COVID-19 outbreak has enabled the development of a variety of assays to diagnose patients based on snippets of the virus's genetic code. But as the number of potential cases increases, and concerns rise about the possibil-

ity of a global pandemic, the pressure is on to enable even faster, more-accessible testing.

The full genome of the novel coronavirus was published on January 10 of this year, just two weeks after the disease was first identified in Wuhan, China. A week later, a group of researchers led by German scientists released the first diagnostic protocol for COVID-19 using swabbed samples from a patient's nose and throat; this PCR-based protocol has since been selected by the World Health Organization (WHO). This test detects the presence of SARS-

CoV-2's *E* gene, which codes for the envelope that surrounds the viral shell, and the gene for the enzyme RNA-dependent RNA polymerase, although to prevent false positives lab technicians may also sequence full genome of all samples. This method of RT-PCR takes 24–48 hours to get a result.

The US CDC has developed an assay that looks for three sequences in the *N* gene, which codes for the nucleocapsid phosphoprotein found in the virus's shell, also known as the capsid. The assay also contains primers for the *RNA-dependent RNA polymerase* gene. The kit contains PCR primer–probe sets for 2 regions of the viral nucleocapsid gene (N1 and N2), and for the human RNase *P* gene to ensure the RNA extraction was successful.

RT-PCR is gold standard but there are now numerous scientists are taking a different approach for the development of commercial test kits in response to the rising diagnostic demands of the epidemic. For instance, the researchers are using CRISPR technology to tag the target SARS-CoV-2 sequences with a fluorescent probe.

Another CRISPR-based diagnostic protocol developed by researchers at the McGovern Institute at MIT uses paper strips to detect the presence of a target virus, and claims to take around one hour to deliver the result. The test still needs to be developed and validated for clinical use, for COVID-19 or any other viral disease.

A different diagnostics approach is through serology i.e. blood tests for antibodies detect IgM, IgA, IgG, or total antibodies against the SARS-CoV-2 virus. The test has major drawback because peak Abs generation takes around 21 days, as a result of this natural delay, antibody testing is not useful in the setting of an acute illness.

Radiographic Tests: Many centers have evaluated the utility of chest imaging for diagnosis. On chest ra-

diography, bilateral pneumonia is the most frequently reported feature.

The most common laboratory biomarkers reported in patients with COVID-19 include decreased albumin (75.8% [95% CI, 30.5% to 100%]), elevated C-reactive protein (58.3% [CI, 21.8% to 94.7%]), and elevated lactate dehydrogenase levels (57.0% [CI, 38.0% to 76.0%]), and lymphopenia (43.1% [CI, 18.9% to 67.3%]).

Other biomarkers that have been reported include increased erythrocyte sedimentation rates; elevated aspartate aminotransferase, alanine aminotransferase, and creatinine kinase levels; leukopenia; leukocytosis; and increased bilirubin and creatinine levels. Such findings are not surprising, because these

biomarkers represent an inflammatory host response to SARS-CoV-2 or are early markers of end-organ dysfunction, similar to that seen in patients with sepsis.

No biomarker or combination of biomarkers currently exists that is sensitive or specific enough to establish a diagnosis of COVID-19

First commercial test for SARS-CoV-2 was Roche's cobas SARS-

How India is doing CoV diagnostic testing

India contains world's second largest population where most of the people lives in congested atmosphere and thus chance of infection is more among them. The decision of early lockdown has proved useful in this way but still

diagnosis of this large population has become a herculean task for the govt. officials.

Diagnosis depend upon population, the more any country have the more number of tests require to rule out the possibility of infection.

“We should be not be panicking, we should be preparing,” Luv Agarwal joint secretary in the Indian health ministry said.”We have followed a pro-active policy

from the beginning. Our focus has been on surveillance and contact tracing. Instead of the virus chasing us, we have been chasing the virus.”

India’s top medical body, the Indian Council of Medical Research (ICMR), has granted approvals for two types of testing kits. One is the real-time polymerase chain reaction (RT-PCR) test, which takes six to eight hours for results to be processed. The second type of test is a rapid antibody test, which gives results in 30 minutes. Though it is not conclusive, ICMR has said that it could be used for cluster-based testing in government-designated hotspots.

The Indian Council of Medical Research on 27th March floated a guidance for rapid testing kits which are based on blood, serum or plasma, and can generate results for exposure to the novel Coronavirus, or SARS-CoV2, within 30 minutes. As per the guidance document, while the kits can indicate exposure to the virus it cannot test for the infection. “Positive test indicates exposure to SARS-CoV-2. Negative test does not rule out COVID-19 infection,” the government’s nodal bio-research agency said. This is because ‘Rapid testing kits’ are considered less reliable compared to real-time polymerase chain reaction (RT-PCR), but help in giving quick result for positive cases. Both tests usually come positive after 7-10 days of infection.

The authority had listed 12 approved rapid testing kits, with 11 having certification from the European regulator. The test kits certified by the European regulator include those by one Singapore-based firm Sensing Self Ltd, two US-based firms BioMedomics and CTK Biotech Inc, and at least five China-based firms like Getein Biotech, Hangzhou Biotest Biotech Co Ltd and Beijing Tigsun Diagnostics Co Ltd. Another Chinese firm Wondfo got its test kit validated by National Institute of Virology in Pune.

India is likely to start manufacturing new serological diagnostic testing kits within the next two months as many advances have been made after the virus was isolated by research agencies, the Indian Council of Medical Research (ICMR) said on April 1st.

Meanwhile, to take speedy decisions on R&D for SARS-CoV2 and Covid-19, the government formed

a science and technology committee co-chaired by V K Paul and principal scientific adviser K Vijayraghavan. The committee will work in coordination with Council of Scientific and Industrial Research (CSIR), department of biotechnology (DBT), department of science and technology (DST) and other science agencies, scientists, industries and regulatory bodies for taking quick decisions on solutions to the disease.

“We are hopeful that at least a serological diagnostic testing will be made in India in next one to two months,” Dr Gangakhedkar said. Serological tests are tests that look for antibodies in blood and help in diagnosing diseases.

In India, testing for COVID-19 is being done by a range of accredited laboratories across the country. Medsource Ozone is gearing up to roll out 300,000 tests a week. It will have the first set of kits in two weeks. It is the only Indian company to have received approvals for both type of test kits—RT-PCR-based and the antibody tests. The 17-year-old biotech company makes a range of test kits, for everything from malaria to HIV. Its test costs slightly more than competitors at 1,600 rupees (\$21) a pop.

According to a speech by PM Modi India has more than 600 Diagnostic centres across India.

Mylab Discovery, in the western city of Pune, became the first Indian firm to get full approval to make and sell testing kits. It shipped the first batch of 150 to diagnostic labs in Pune, Mumbai, Delhi, Goa and Bengaluru (Bangalore) this week. The molecular diagnostic company, which also makes testing kits for HIV and Hepatitis B and C, and other diseases, says it can supply up to 100,000 Covid-19 testing kits a week and can produce up to 200,000 if needed. Each Mylab kit can test 100 samples and costs 1,200 rupees (\$16; £13) - that’s about a quarter of the 4,500 rupees that India pays to import Covid-19 testing kits from abroad.

Ms Bhosale, who headed the team that designed the coronavirus testing kit called Patho Detect, said it was done “in record time” - six weeks instead of three or four months. She submitted the kit for evaluation by the National Institute of Virology (NIV) on 18 March.

Before submitting the kits for evaluation, the team had to check and re-check all the parameters to ensure its results that were precise, and accurate.

“If you carry out 10 tests on the same sample, all 10 results should be same,” said Ms Bhosale. “And we achieved that. Our kit was perfect.” The government-run Indian Council for Medical Research (ICMR), under which NIV operates, agreed. It said Mylab was the only Indian company to achieve 100% results.

In the past few days, India has scaled up testing. Initially, only the state labs were allowed to test for coronavirus, but permission has now been extended to several private labs too. And on 28th March, India also gave approvals to 15 private companies to commercially sell diagnostic kits based on licences they have obtained in the US, European Union and some other countries.

According to update on ICMR website, Total Operational (initiated independent testing) Government Laboratories reporting to ICMR was 197 including 3 collection sites. 82 Private Laboratories were designated to test COVID-19 and 6 new COVID-19 Govt. & Private testing laboratories were approved as per request of the State Govt

Conclusion

In India, National Institute of Virology, ICMR, Pune has been assigned as WHO reference laboratories providing confirmatory testing for COVID-19. As per recent update on 18 April 2020, a total of 3,72,123 samples from 3,54,969 individuals have been tested and 16,365 individuals have been confirmed positive among suspected cases and contacts of

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Analysis

Race against COVID19 treatment

by Biotech Express Bureau

There is no cure (or vaccine) against COVID19; Doctors can only relieve the symptoms. Since it is a new pathogen the chance of making a candidate vaccine very soon is very low, yet world's scientists are working rigorously to find one. The biotech industry, both by pharmaceutical companies and research organisations across the world are working on the development of novel coronavirus vaccines and possible treatment.

But to kill the virus a chemical or biological entity is required which takes time for discovery, approval and gain trust.

The most effective agent for any viral disease is vaccine. Vaccine attenuates the virus and also helps our immune system to destroy and recognize the virus by making antibodies.

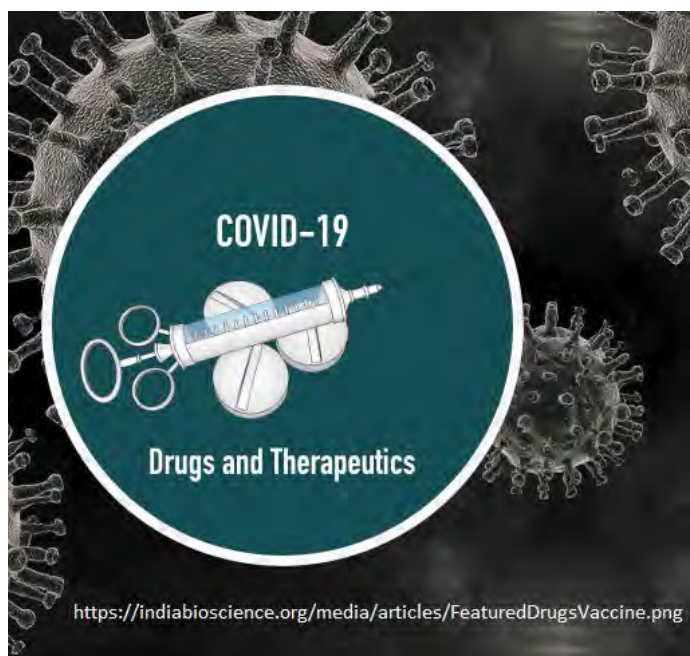
According to a post update of Livemint.com on 16th April, nearly 70 'vaccine candidates' are being tested and at least three have moved to the human clinical trial stage, but a vaccine for the novel coronavirus is unlikely to be ready for mass use before 2021.

The pioneer research from India seeking for vaccine candidate came after Scientists, led by Shailendra K. Saxena, sequenced the genes that encode the spike (S) proteins in the outer layer of two strains of coronaviruses isolated from the seafood market of Wuhan, where the novel virus first emerged. They then compared the S protein-coding genes of the novel coronaviruses with those of different strains of SARS-CoV that usually infects bats. The study was published online on 28 March 2020 in Nature.

In a statement of 27th March, the Indian Council for Medical Research said on Friday that India is likely to participate in the solidarity trial of coronavirus vaccine to be conducted by the World Health Organization. "We are likely to start our participation soon in solidarity trial that the World Health Organization is starting.

Earlier we did not do it because our numbers were so small that our contribution would have looked minuscule. The ICMR has asked the Department of Biotechnology (DBT) to undertake vaccine development programme.

On 9th April, two candidate vaccines for COVID-19 have entered the first phase of human clinical trials and another 60 candidate vaccines were in pre-clinical studies, the World Health Organisation (WHO) confirmed.



<https://indiabioscience.org/media/articles/FeaturedDrugsVaccine.png>

Vaccine Candidates

The most recent vaccine candidate jointly developed by CanSino Biological Inc and Beijing Institute of Biotechnology uses the non-replicating viral vector as the platform, same as the non-corona candidates like Ebola, to develop a vaccine with a 'Adenovirus Type 5' candidate.

US drugmaker Gilead is racing against time with its anti-viral drug Remdesivir. This anti-viral drug is undergoing large trials in China and could be a front runner in coronavirus treatments. According to the company, the drug showed good results in animal testing against MERS and SARS, both of which are also types of coronaviruses. This experimental drug was also been tested against Ebola, however, despite success in animal testing, the drug did not fare too well in humans. The drug is yet not approved to treat any disease, but the company is hoping it could be an effective treatment against Coronavirus.

Another US biopharma company Altimune is working on an intranasal coronavirus vaccine, which is being developed based on a vaccine technology platform similar to NasoVAX, the influenza vaccine developed by Altimune. Animal testing will begin shortly.

mRNA-1273 vaccine by Moderna and Vaccine Research Center entered in phase one clinical trials in April.

China's National Medical Products Administration has approved Favilavir, an anti-viral drug as a treatment against coronavirus. The drug is being touted as the first approved coronavirus drug. While clinical trials are still ongoing in Shenzhen, Guangdong province, results of clinical trials involving 70 patients reportedly showed treatment efficacy with very little side effects.

Korean drugmaker Ilyang Pharma has claimed that its Leukemia drug Supect is found effective against coronavirus. However, it is still to be approved by drug authorities in the country.

Indian drug regulator has approved "restricted use" of combination Liponavir and Ritonavir. This was used by doctors in Sawai Man Singh (SMS) Hospital who claim to have successfully cured Italian COVID-19 patients using a combination of these drugs with swine flu and malaria drugs. Experts said a lot more clinical trials are needed to establish replicability of this treatment. Some Indian firms taking the lead are

Serum Institute of India and Zydus Cadila who have disclosed their candidates for coronavirus vaccine.

In India Adar C. Poonawalla, CEO of Pune-based Serum Institute of India, the world's largest vaccine manufacturer, announced that SII has collaborated with two American companies to develop a Make in India Covid-19 vaccine.

More recently, plasma therapy has been used in the treatment of diseases like SARS in 2003, which was also caused by a coronavirus, as well as MERS in 2012. The therapy is the Convalescent Plasma Therapy. Chances of treating coronavirus patients with plasma therapy are looking up, with the Indian Council of Medical Research (ICMR) hoping to begin clinical trials within the next two weeks. Several states, including Kerala, Maharashtra, Tamil Nadu and Delhi have sought permission from the Centre to conduct plasma therapy to treat coronavirus patients.

An international effort, 'The coalition of Epidemic Preparedness Innovations' (CEPI), a global collaboration between public, private, philanthropic, and civil society organisations to develop vaccines for infectious disease epidemics, is currently supporting developmental work on four vaccine candidates. Research organisations such as the National Institutes of Health (NIH), US and Indian Council of Medical Research are also developing a vaccine for the coronavirus.

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News of Focus

Scientists, led by Shailendra K. Saxena is the first Indian group to work on CoV vaccine



Photo: Shailendra K. Saxena
Professor and Head, Centre
for Advance Research, King
George's Medical,
University (KGMU), Lucknow,
India

March 29, 2020 | Researchers from the King George's Medical University in Lucknow have discovered that the novel coronavirus (2019-nCoV) has new sites in the proteins in its outer layer¹. The virus, they say, utilises such novel sites to rapidly infect host cells – a potential factor that probably played a part in the ongoing pandemic.

They have also shown that the novel coronavirus is structurally close to the SARS coronavirus, suggesting that the inhibitors designed to disrupt the SARS-CoV proliferation inside the host cells may also be used as a therapy for the latest novel coronavirus.

Scientists, led by Shailendra K. Saxena, sequenced the genes that encode the spike (S) proteins in the outer layer of two strains of coronaviruses isolated from the seafood market of Wuhan, where the novel virus first emerged. They then compared the S protein-coding genes of the novel coronaviruses with those of different strains of SARS-CoV that usually infects bats.

Hydroxychloroquine in Coronavirus pandemic

Hydroxychloroquine has been proposed as a choice of drug for preventing symptoms of COVID19. Although hydroxychloroquine as a treatment for infection with the novel coronavirus has received a statement of concern from the society that publishes the journal in which the work appeared, the fight over its procurement has intensified. India, the biggest exporter of the drug has received so much attention worldwide as every country need it for their people. It looks apparent that any governments do not want to miss any chance to treat casualties of their country and thus creating stocks before they deplete in international market.

India manufactures 70 per cent of the world's supply of hydroxychloroquine, according to Indian Pharmaceutical Alliance (IPA). The country has a production capacity of 40 tonnes of hydroxychloroquine (HCQ) every month, implying 20 crore tablets of 200 mg each.

About Hydroxychloroquine

Hydroxychloroquine is very similar to Chloroquine, one of the oldest and best-known anti-malarial drugs. The drug – which can also treat auto-immune diseases like rheumatoid arthritis and lupus – has also attracted attention over the past few decades as a potential antiviral agent.

Before coming to any conclusion about the possible treatment of COVID19 by Hydroxychloroquine it is important to understand the side effects of drug too

and require more confirmatory studies to check its efficacy in COVID19 treatment.

The more common side effects that can occur with hydroxychloroquine include: headache, dizziness, diarrhea, stomach cramps, vomiting and Serious side effects and their symptoms can include blurred vision or other vision changes, which may be permanent in some cases, heart disease, including heart failure and issues with your heart rhythm; some cases have been fatal, ringing in your ears or hearing loss, angioedema (rapid swelling of your skin), hives, mild or severe bronchospasm, sore throat, severe hypoglycemia, unusual bleeding or bruising, blue-black skin color, muscle weakness, hair loss or changes in hair color, abnormal mood changes, mental health effects, including suicidal thoughts.

Beware of Fake CoV Information Dashboards

According to Shai Alfasi, a security researcher at Reason Labs, hackers have developed a fake version of online dashboards which are used to track the coronavirus impact in real-time.

Alfasi claimed some hackers are stealing personal data such as user names, passwords, credit card numbers and other data stored in users' browsers by creating a fake version of these dashboards.

The duplicitous dashboards prompt users to download an application which is eventually a malware. The application once installed in the system steals the stored data.

In some cases, users don't even need to install the malicious software as opening the website on a browser is enough for the malware to scrape data.

Currently, this malicious software only works on Microsoft Windows systems. However, Alfasi believes that hackers might soon come with an updated version of the malware to impact other operating systems as well.

NIV Pune Scientists first to deposit gene sequence of coronavirus from the country

Four Indian scientists from ICMR-NIV deposited first genome of coronavirus from India to NCBI Genbank. The online accession link of this full RNA genome is <https://www.ncbi.nlm.nih.gov/nuccore/MT050493>. Scientists called it Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has a genome size of 29851 bp. Genome was submitted on 6th March 2020.

The four scientists are:

1. PRAGYA D YADAV, Scientist E

Her areas of interest are Molecular biology, Virology, Biocontainment. She has experience of Operation and management of BSL-4 laboratory and currently working in BSL-4 laboratory of MCC, NIV, Pune as a core member.

2. VARSHA POTDAR, SCIENTIST D

Her Current Interests include Molecular Diagnosis and characterization of Influenza viruses, Monitoring genetic variations in circulating influenza viruses, Influenza viruses and its drug susceptibility to amantadine and Oseltamivir. HA 1 gene sequencing and phylogenetic relationship with vaccine component, Detection of emerging viral outbreaks. She has also role in software development (virus limes).

3. M L CHOUDHARY, SCIENTIST D

His Current Interests include Molecular Biology, Development of diagnostic kits and Development of vaccines of Influenza virus.

4. ANITA MOHAN SHETE AICH

She is working BSL4 Lab of Maximum Containment Laboratory, Microbial Containment Complex, National Institute of Virology.

A Wuhan shrimp seller identified as coronavirus 'patient zero'

March 30, 2020 | A 57-year-old female shrimp seller in China's Wuhan city, the originating point of the coronavirus pandemic, has been identified as one of the first victims of coronavirus

The coronavirus 'patient zero', who made a full recovery in January after month-long treatment, believes the Chinese government could have checked the spread of the disease had it acted sooner.

Wei Guixian, as identified by The Wall Street Journal, was selling shrimps at the Huanan Seafood Market on December 10 when she developed a cold. Believing she had the common flu, Wei went to a local clinic for treatment where she was given an injection, the

Mirror UK reported. However, Wei continued to feel weak and visited Eleventh Hospital in Wuhan a day later.

The feeling of lethargy persisted and Wei visited one of the biggest medical facilities in the region -- Wuhan Union Hospital -- on December 16. At the Union Hospital, Wei was told her sickness was "ruthless" and that many from Huanan Market had visited the hospital with matching symptoms.

Wei regained her health in January. The COVID-19 'patient zero' believes she got the disease from a toilet she shared with meat sellers in the market. She said several vendors trading close to her also contracted the killer disease.

In a release, Wuhan Municipal Health Commission confirmed Wei was among the first 27 patients to test positive for COVID-19 and one of 24 cases directly related to the market.



China death toll jumps dramatically

April 17, 2020 | China's death toll from the coronavirus has jumped sharply, after the city of Wuhan, where the virus emerged last year, added another 1,300 fatalities to its official count. The revision raises the death toll in the 11-million-person city by 50% to 3,869, and brings the China's overall death toll to more than 4,600.

Deaths from the coronavirus are difficult to count in the absence of widespread testing. Chinese officials said the reasons for the revision included the addition of deaths of people at home and at medical institutions that weren't reporting data to its epidemic network.

The president accused the WHO of mismanaging the outbreak and "covering up the spread" of COVID-19 in a White House press briefing on Tuesday evening. The announcement comes amid criticism of the Trump administration's own handling of the outbreak, which has now claimed more than 26,000 lives in the United States.

But the WHO warned on 23 January that the coronavirus would be exported from China. And on 30 January, the organization called the coronavirus outbreak a public health emergency of international concern — its highest alert level.

The United States has contributed more than US\$800 million to the WHO over the past two years, making it the largest contributor to the organization's roughly \$2.8-billion annual budget.

Trump suspends World Health Organization funding

April 16, 2020 | US President Donald Trump said on 14 April that he would halt the country's funding for the World Health Organization (WHO), pending a review of how the organization has handled the coronavirus pandemic.



5 research projects launched to mitigate Coronavirus spread in India

April 3, 2020 | The government has launched a nationwide research and development (R&D) initiative to combat coronavirus, which neither has a medicine nor a vaccine.

The Department of Science and Technology - Science and Engineering Board (DST-SERB) has announced several special research projects. The first set of 5 projects have been selected for further development into implementable technologies.

These projects were selected after peer-review and assessment by a Special Expert Committee for CoVID-19 projects.

It is estimated that over 24,000 research papers have already appeared across the world in the last four months.

FDA Scientific Brief: Bacille Calmette-Guérin (BCG) vaccination and COVID-19

12 April 2020 | There is no evidence that the Bacille Calmette-Guérin vaccine (BCG) protects people against infection with COVID-19 virus.

Two clinical trials addressing this question are underway, and WHO will evaluate the evidence when it is available. In the absence of evidence, WHO does not recommend BCG vaccination for the prevention of COVID-19.

WHO continues to recommend neonatal BCG vaccination in countries or settings with a high incidence of tuberculosis. BCG vaccination prevents severe forms of tuberculosis in children and diversion of local supplies may result in neonates not being vaccinated, resulting in an increase of disease and deaths from tuberculosis.

In the absence of evidence, WHO does not recommend BCG vaccination for the prevention of COVID-19. WHO continues to recommend neonatal BCG vaccination in countries or settings with a high incidence of tuberculosis.

FDA Authorizes Blood Purification Device to Treat COVID-19



April 10, 2020 | The U.S. Food and Drug Administration issued an emergency use authorization for a blood purification system to treat patients 18 years of age or older with confirmed Coronavirus Disease 2019 (COVID-19) admitted to the intensive care unit (ICU) with confirmed or imminent respiratory failure.

The authorized product works by reducing the amount of cytokines and other inflammatory mediators, i.e., small active proteins in the bloodstream that control a cell's immune response by filtering the blood and returning the filtered blood to the patient.

The proteins that are removed are typically elevated during infections and can be associated with a “cytokine storm” that occurs in some COVID-19 patients, leading to severe inflammation, rapidly progressive shock, respiratory failure, organ failure and death.

The FDA issued this emergency use authorization to Terumo BCT Inc. and Marker Therapeutics AG for their Spectra Optia Apheresis System and Depuro D2000 Adsorption Cartridge devices.



FDA Encourages Recovered Patients to Donate Plasma for Development of Blood-Related Therapies

April 16, 2020 | The key to ensuring the availability of convalescent plasma to those in greatest need is getting recovered COVID-19 patients to donate plasma. The FDA has launched a new webpage to guide recovered COVID-19 patients to local blood or plasma collection centers to discuss their eligibility and potentially schedule an appointment to donate. The webpage also provides information for those interested in participating in the expanded access protocol, conducting clinical trials or submitting eIND applications. The American Red Cross has also set up a website for interested donors (www.redcross.org/plasma-4covid) and the FDA continues to work with others in this area to help encourage additional donations.

Convalescent plasma is an antibody-rich product made from blood donated by people who have recovered from the disease caused by the virus. Prior experience with respiratory viruses and limited data that have emerged from China suggest that convales-

cent plasma has the potential to lessen the severity or shorten the length of illness caused by COVID-19. It is important that we evaluate this potential therapy in the context of clinical trials, through expanded access, as well as facilitate emergency access for individual patients, as appropriate.

FDA, Gates Foundation, United Health Group, Quantigen, and U.S. Cotton Collaborate to Address Testing Supply Needs

April 16, 2020 | The U.S. Food and Drug Administration announced a further expansion of COVID-19 testing options through the recognition that spun synthetic swabs – with a design similar to Q-tips – could be used to test patients by collecting a sample from the front of the nose.

As part of this effort, U.S. Cotton, the largest manufacturer of cotton swabs and a subsidiary of Parkdale-Mills, developed a polyester-based Q-tip-type swab that is fully synthetic for compatibility with COVID-19 testing. Harnessing its large-scale U.S.-based manufacturing capabilities, U.S. Cotton plans to produce these new polyester swabs in large quantities to help meet the needs for coronavirus diagnostic testing.

“This action today demonstrates the ingenuity that results from the FDA working in partnership with the private sector. The Trump Administration has been working side-by-side with our industry partners to fight this pandemic, and today is a great example of that work. We appreciate work by UnitedHealth Group, Quantigen, and the Gates Foundation to perform and support the clinical studies necessary for this advancement. We also want to acknowledge U.S. Cotton’s efforts to manufacture a new type of swab for



COVID-19 testing that can be produced at scale. We appreciate the work of these collaborators to consider how these test supplies could be broadly distributed to meet not only the testing needs of the United States but also global needs around the pandemic. All of these actions by these American organizations will help continue to expand our testing capability,” said FDA Commissioner Stephen M. Hahn, M.D.

This finding that spun synthetic swabs could be used for COVID-19 testing is based on results from a clinical investigation that represents a collaboration between the FDA, UnitedHealth Group, the Gates Foundation, and Quantigen. The type of testing at the front of the nose used in this study is notable because it allows self-collection by patients thereby limiting exposure of healthcare providers; it is more comfortable for patients and it can be performed by a swab that is more readily available and manufacturable at scale.

Federal judge enters temporary injunction after ‘Miracle Mineral Solution’ controversy

April 17, 2020 | A federal court has entered a temporary injunction against the Genesis II Church of Health and Healing (Genesis) and four individuals associated with the entity requiring them to immediately stop distributing its “Miracle Mineral Solution” (MMS), an unproven and potentially harmful treatment offered for sale to treat Coronavirus, which includes Coronavirus Disease 2019 (COVID-19) and many other diseases.

In granting the government’s request for relief, the court found that the United States has demonstrated that Genesis and the associated individuals named in the injunction are violating the Federal Food, Drug, and Cosmetic Act (FD&C) by unlawfully distributing MMS, an unapproved new drug and misbranded drug. When combined with the included activator

MMS has a chlorine dioxide content equivalent to industrial bleach. The court also found that there is a danger that the defendants will continue violating the law without the temporary restraining order.

The FDA has not approved Genesis’s product for any use, despite the defendants’ claims that these products can be used to cure, mitigate, treat or prevent diseases such as COVID-19, Alzheimer’s, autism, brain cancer, multiple sclerosis and HIV/AIDS. Claims made on the Genesis websites, which provide a link to purchase MMS, include, “The Coronavirus is curable, you believe that? . . . MMS will kill it.” The agency is not aware of any scientific evidence supporting the safety or efficacy of MMS to treat any disease and there are no approved drug applications in effect for the defendants’ MMS.

The FDA is particularly concerned that products that claim to cure, treat or prevent serious diseases like COVID-19 may cause consumers to delay or stop appropriate medical treatment, leading to serious and life-threatening harm.

The FDA reminds the public to seek medical help from their health care providers. Additionally, children are a vulnerable population that may be at greater risk for adverse reactions from consuming chlorine dioxide products. The FDA encourages health care professionals and consumers to report adverse events or quality problems experienced with the use of COVID-19 products to the FDA’s MedWatch Adverse Event Reporting program.



United Kingdom launches massive coronavirus diagnostic network



The UK government opened its first mass coronavirus-testing facility on 9 April.

The lab, in Milton Keynes, is the first of three such facilities to open. The others — in Glasgow and Alderley Park in Nether Alderley — are scheduled to open within the next two weeks. In March, the UK government requisitioned polymerase chain reaction machines from university labs across the country in order to outfit these central testing facilities.

The labs — which the government says make up the largest diagnostic network in UK history — will prioritize processing samples from health-care providers who are currently self-isolating, in order to allow them to return to work. The Milton Keynes facility can currently process thousands of tests per day, but is continuing to ramp up its capacity through the use of robotics.

The government hopes to be able to analyse 100,000 coronavirus tests daily by the end of the month, health secretary Matt Hancock reiterated on 9 April. Fewer than 300,000 tests have been carried out in the country so far, according to official reports.

Universities across the United Kingdom and around the world are also running COVID-19 diagnostic tests, as Nature previously reported. But these efforts in the United States have been hampered by bureaucratic and logistical barriers, and a lack of a cohesive national strategy.

World's biggest trial of drug to treat Covid-19 begins in UK

The Recovery trial has recruited over 5,000 patients in 165 NHS hospitals around the UK in a month, ahead of similar trials in the US and Europe, which have a few hundred.

“This is by far the largest trial in the world,” said Peter Horby, professor of emerging infectious diseases and global health at Oxford University, who is leading it. He has previously led Ebola drug trials in west Africa and the Democratic Republic of the Congo (DRC).

Both hydroxychloroquine and azithromycin are being tested separately as part of the Recovery trial, and if there is any effect in patients given those drugs alone, compared with those given no drugs, they can be combined later.

The number of patients being enrolled on the Recovery trial across the UK tells a story of doctors who have faith in scientific evidence over hope alone. Ten per cent of Covid-19 patients in the UK are now taking part in the trial, and the researchers say the more people join, the sooner they will have answers.

Also in the trial now are a combination of two antiretroviral drugs used in HIV treatment, lopinavir-ritonavir, known by the brand name Kaletra, and low-dose dexamethasone, a type of steroid used in a range of conditions, typically to reduce inflammation.

COVID19 Proposals

CEPI Call for Proposals:

Centralized laboratory for measurement of immune responses elicited by SARS-CoV-2 vaccine candidates

The Department of Biotechnology is implementing the Ind-CEPI mission titled 'India Centric Epidemic Preparedness through Rapid Vaccine Development: Supporting Indian Vaccine Development Aligned with the Global Initiative of the Coalition for Epidemic Preparedness Innovations (CEPI)' to strengthen development of vaccines for the diseases of epidemic potential in India.

CEPI is a global alliance financing and coordinating the development of vaccines against infectious diseases. From time to time, CEPI issues calls for proposals inviting applicants to submit funding proposals for projects to develop specific vaccine candidates or research that can directly support vaccine development.

In the present scenario of the global pandemic of COVID-19, CEPI has recently issued a Call for Proposal- 'Centralized laboratory for measurement of immune responses elicited by SARS-CoV-2 vaccine candidates'.

The Department of Biotechnology solicits participation of Indian scientist for submission of applications to CEPI under the call. Kindly visit the CEPI website for more details of the call at https://cepi.net/get_involved/cfps/



IUSSTF

Indo-US Science and Technology Forum

Call for Proposals Indo-U.S. Virtual Networks for **COVID-19**

Across the world, countries are being challenged by the COVID-19 pandemic in ways they have never been before. To support the global efforts of the medical and scientific community, the Indo-U.S. Science and Technology Forum (IUSSTF) announces a **Call for Proposals** to support **COVID-19 Virtual Networks**. IUSSTF invites proposals that highlight the value of the Indo-U.S. partnership to advance research and address critical challenges related to COVID-19.

Virtual Networks would allow Indian and U.S. scientists and engineers currently engaged in COVID-related research to carry out joint research activities through a virtual mechanism, leveraging existing infrastructure and funding. Proposals are invited in two categories:

- **Knowledge R&D Networks** that enable Indian and U.S. scientists from Academia and Laboratories to conduct joint research and encourage the integration of research and education.
- **Public-Private Virtual Networks** that enable Indian and U.S. scientists from Academia and Industry to collaborate on pre-commercial R&D activities having potential towards applied research and product development.

Eligibility

- Teams at Indian and U.S. Academic Institutions, Laboratories and/or Industries that are actively engaged in COVID-19 research funded by Federal Agencies and/or Foundations.
- Each proposal must involve at least one Indian and one U.S. Institution.
- All partners should have intellectual and financial stake in the activities by contributing resources required for project execution.

Type and Extent of Funding by IUSSTF

- INR 25,00,000/- to INR 50,00,000/- per project [approx. USD 33,000 to USD 66,000].
- Funding would be available for a period of 18 months.
- The Grant-in-Aid would cover:
 - ◆ Partial support for Personnel (Students/PostDocs);
 - ◆ Basic Infrastructure (limited supplies), if needed;
 - ◆ Limited travel (with justification); and,
 - ◆ Contingencies for dissemination of research, educational materials and reports.

Application Process

Applications will be accepted at <https://covid19.iusstf.online>

For more details please visit:
www.iusstf.org

Proposal Submission Deadline: 15 May 2020
Contact us at: virtual.center@indousstf.org

United States - India Science and Technology Endowment Fund

Special Call for COVID-19 Ignition Grants

Science, Engineering, and Technology will play a critical role in finding solutions to the COVID-19 global challenge through the development of new vaccines, devices, diagnostic tools, and information systems, as well as strategies to help communities and nations manage and deploy resources to combat this pandemic.

The aim of the **United States-India Science & Technology Endowment Fund (USISTEF)** is to support and foster joint applied R&D to generate public good through the commercialization of technology developed through sustained partnerships. In keeping with its' vision, USISTEF announces a **Special Call for Proposals** under the category of **COVID-19 Ignition Grants**. USISTEF encourages projects that demonstrate a high degree of innovation leveraging advances in science and technology.

Objectives

USISTEF invites U.S.-India S&T based entrepreneurial initiatives that address *"development and implementation of new technologies, tools, and systems to address COVID-19 related challenges including, but not limited to, monitoring, diagnosis, health and safety, public outreach, information and communication"*.

Eligibility

- Binational Teams with unique/complementary expertise/resources being leveraged from each partner.
- Initiatives can originate from government, academic, non-governmental or commercial entities, and any combination thereof.

Proposals will be solicited in two categories

- **Ignition Stage I:** To help early-stage creative ideas develop a proof-of-concept and/or build a prototype [Grant support up to INR 50,00,000/- or approx..\$66,000/-]
- **Ignition Stage II:** To support a team with a workable, validated prototype and/or with the ability to repurpose existing innovative solutions to meet the COVID-19 challenge [Grant support up to INR 1,00,00,000/- or approx..\$1,33,000/-]

Application Process

Applications will be accepted online from 15th April 2020 onwards
with a submission deadline of 15th May 2020.

For more details, please visit www.iusstf.org

Indo-U.S. Science & Technology Forum

www.iusstf.org

Call for Proposals

Indo-U.S. Virtual Networks for COVID-19

Introduction

To support the global efforts of the medical and scientific community, IUSSTF announces a Call for Proposals for COVID-19 Indo-U.S. Virtual Networks. IUSSTF encourages proposals that convincingly demonstrate the benefits and value of the Indo-U.S. partnership to advance research and address critical challenges related to COVID-19. Virtual Networks would allow Indian and U.S. scientists and engineers currently engaged in COVID-related research to carry out joint research activities through a virtual mechanism, leveraging existing infrastructure and funding.

The network projects could be of two types:

- Knowledge R&D Networks that enable Indian and U.S. scientists from Academia and National Laboratories to conduct joint research and encourage the integration of research and education.
- Public-Private Virtual Networks that enable Indian and U.S. scientists from Academia and Industry to collaborate on pre-commercial R&D activities having potential towards applied research and product development.

Eligibility

- Teams at Indian and U.S. Academic Institutions, Laboratories and/or Industries that are actively engaged in COVID-19 research funded by Federal Agencies and/or Foundations.
- Each proposal must involve at least one Indian and one U.S. Institution.
- All partners should have intellectual and financial stake in the activities by contributing resources required for project execution.

Type and Extent of Funding by IUSSTF - INR 25,00,000/- to INR 50,00,000/- per project [approx.. \$33,000/- to \$66,000/-]. Funding would be available for a period of 18 months.

The Grant-in-Aid would cover:

- Partial support for Personnel (Students/PostDocs);
- Basic Infrastructure (limited supplies), if needed;
- Limited travel (with justification); and,
- Contingencies for dissemination of research, educational materials and reports.

Application Process: Applications will be accepted online from 15 April 2020 onwards with a submission deadline of 15 May 2020. While we wait for the call to open, you may like to take a look at the application format at Annexure I.



SCIENCE AND ENGINEERING RESEARCH BOARD

Short-term MATRICS special call on Mathematical Modeling and Computations for COVID-19 Infections

COVID-19 has become a global pandemic straining health system in many countries. In the absence of a COVID-19 vaccine, reducing the contact rates in the population is considered to be a better option to reduce the transmission of the deadly coronavirus. As R&D units of the nation is striving to come up with antivirals and vaccines to eliminate this virus, it is also important to develop mathematical models to study the rate of spread of COVID-19 among the population. Similarly, data driven inference is also critical for forecasting of coronavirus infections.

In this context, SERB announces short-term projects in the following areas, preferably with multidisciplinary efforts under its MATRICS program:

- Mathematical Modeling of COVID-19 Spread
- Statistical Machine Learning, Forecasting and Inferences from Pandemic Data
- Focused Algorithms for Infectious Disease Modeling
- Quantitative Social Science Approaches for Epidemiological Models

Project duration would be one year with a fixed grant of Rs. 5 lakh plus overhead. Proposals should be submitted through SERB online portal (www.serbonline.in) in MATRICS format.

Project proposals which are not related to the theme of the call will not be considered.

Project proposals will be evaluated on first-come basis, with a last date of submission as April 30, 2020.

Applicants holding ongoing projects under MATRICS are also eligible to apply under this call.



Science and Engineering Research Board
DST, Govt. of India

SERB IRHPA

Call for Proposal

COVID-19 and related respiratory viral infections

Academic and research institutions are encouraged to submit competitive proposals having a strong interdisciplinary component between chemists, biologists, virologists, immunologists, and clinicians, in the following areas. One of the participating institutions should have access to BSL-3 and above facilities, along with expertise of handling respiratory viruses as per WHO/Govt. of India protocols.

- New or repurposed antivirals against valid viral targets; viricidal coatings; etc.
- Affordable diagnostics for symptomatic and asymptomatic respiratory viral infections
- Investigational vaccines against respiratory viruses
- Development of disease models for respiratory viral infections
- Studies on immune response and immunity during respiratory viral infections
- Epidemiology of COVID and other respiratory viral infections

It is desirable to bring technical partnerships and collaborative know-how from biotech and pharmaceutical companies. SERB is committed for strategic investments to accelerate antiviral research under aforementioned verticals.

Proposals should be submitted as per SERB-IRHPA format by April 30, 2020 (5 pm) through SERB online portal.

Contact Details:

Dr. A.V. Balachandar, Scientist E | Email: venkatbala@serb.gov.in

Tel: 011-40000337(availability subject to lockdown rules)



सत्यमेव जयते

Department of Science and Technology (DST)

DST

NANO MISSION

Short-term Research Grant special call for Nano Coating COVID-19 (April 03, 2020)

Considering emerging health care requirements to combat the COVID-19 epidemic, DST & SERB announces rapid/ short-term projects in the following thrust areas, preferably with multidisciplinary efforts:

Antiviral Nano-coatings for materials to be used on appropriate material for producing anti-COVID-19 Triple Layer Medical masks and N-95 respirator or better masks in large quantities;

All components of Personal Protective Equipment (PPE) for safeguarding the health of all health care workers against COVID-19 with industrial partners for scaling up production; and

Project duration should be maximum up to 1-year with a maximum budget limit of Rs. 25-30 lakhs (including overhead) for developing the Nano-coating and new nano based material for the components of PPE, which can be transferred to the partnering Industry or a Start-up. The industry contribution could be in the form of manpower and its CTC, or partly for testing of nano-coating to meet the EU or US standards for exporting the developed product. Proposals should be submitted through SERB online portal (www.serb-online.in) in their Core Research Grant (CRG) format.

Proposals will be initially screened for the competence of PI, suitability and scope prior to peer-review. All items developed and transferred to industry should meet the International standards or BSI standards for ensuring Quality of the nano-coating based product produced.

Projects concerning other pathogens will not be considered in this call. It may be Noted that no hardcopy of the proposal may be sent to DST or SERB.

Projects will be evaluated on first-come basis, with a last date of submission as April 30, 2020.

Contact Details:

Dr. T. Thangaradjou, Scientist E, Email: ttradjou@serb.gov.in

Shri Rajiv Khanna, Scientist C, DST & Dr Nagaboopathy Mohan, Scientist C, DST

Email: Khanna.rk@nic.in & boopathy.m@gov.in



ICMR Call for Letter of Intent for Participation in:

Phase II, Open Label, Randomized Controlled Study to Assess the Safety and Efficacy of Convalescent Plasma to Limit COVID-19 Associated Complications

Convalescent Plasma is an experimental procedure for COVID-19 patients. Hospitals and Institutions planning to provide this modality of treatment should do so in a clinical trial with protocols which are cleared by the Institutional Ethics Committee. The protocols should be: -

1. Registered with the Clinical Trial Registry of India (CTRI: <http://ctri.nic.in/Clinicaltrials/login.php>).
2. They should be approved by Drugs Controller General of India, Central Drugs Standard Control Organization (<https://cdsco.gov.in/opencms/opencms/en/Home>).
3. Mechanisms to report adverse and serious adverse events to the CDSCO should be put in place.

At this moment ICMR does not recommend this as a treatment option outside of clinical trials.

ICMR is inviting a letter of intent from institutions with the equipment and infrastructure available to participate in a clinical trial to study the safety and efficacy of convalescent plasma in COVID-19 patients, subsequent to necessary approvals and clearances.

Institutions which are interested to collaborate with ICMR on undertaking this trial intervention, may express their interest by providing the details through the following link:

<https://forms.gle/fZvhKuyaTAgLjY1SA>

For further details please contact:

Dr. Anup Agarwal | Email: mailanupagarwal@gmail.com

More Info: <https://icmr.nic.in/>



Call for Letter of Intent for Participation

Therapeutic Plasma Exchange in COVID-19: Protocol for a Multi-center, Phase II, Open Label, Randomized Controlled Study

Therapeutic Plasma Exchange (TPE) is an experimental procedure for critically ill COVID-19 patients. Hospitals and Institutions planning to provide this modality of treatment should do so in a clinical trial with protocols which are cleared by the Institutional Ethics Committee. The protocols should be: -

1. Registered with the Clinical Trial Registry of India (CTRI: <http://ctri.nic.in/Clinicaltrials/login.php>).
2. They should be approved by Drugs Controller General of India, Central Drugs Standard Control Organization (<https://cdsco.gov.in/opencms/opencms/en/Home>).
3. Mechanisms to report adverse and serious adverse events to the CDSCO should be put in place.

At this moment ICMR does not recommend this as a treatment option outside of clinical trials. ICMR is inviting a letter of intent from institutions with the equipment and infrastructure available to participate in a clinical trial to study the safety and efficacy of therapeutic plasma exchange in COVID-19 patients, subsequent to necessary approvals and clearances.

Institutions which are interested to collaborate with ICMR on undertaking this trial intervention, may express their interest by providing the details through the following link: <https://forms.gle/7AaW528DMQbNZsUr9>

For further details please contact:

Dr. Anup Agarwal | Email: mailanupagarwal@gmail.com

More Info: <https://icmr.nic.in/>



INDIAN COUNCIL OF MEDICAL RESEARCH
DEPARTMENT OF HEALTH RESEARCH



Applications invited from Government & Private Medical Colleges for setting up COVID-19 testing facility

ICMR invites applications from all Government and Private Medical Colleges for establishing a COVID-19 testing facility. All Medical Colleges with following infrastructure and expertise may apply:

- i. Availability of a BSL-2 level laboratory facility including a molecular biology setup for virological diagnosis and a functioning and calibrated Biosafety cabinet type 2A/2B in the laboratory.
- ii. Availability of cold centrifuge/microfuge for RNA extraction
- iii. Availability of a functioning and calibrated real-time PCR machine.
- iv. Staff Requirements:
 - A. Availability of following minimum staff:
 - Medical Microbiologists – 1 or more with experience of work in Molecular Virology.
 - Technicians – At least 4-6 (2-3/shift) with relevant experience of work in Molecular Virology.
 - Multi-Task Staff – 1 or more for washing / cleaning
 - B. Desired expertise of the staff: Good understanding of laboratory biosafety and biosecurity, trained for handling respiratory samples for viral diagnosis, RNA extraction and real-time PCR.
 - Experience of work in virology and handling clinical specimens, especially respiratory samples.
- v. A robust Institutional policy on biomedical waste management of human origin. vi. Well defined arrangement for segregation and discarding of biomedical waste.

Additionally, for all applicants from Private Medical Colleges, it is essential to submit a copy of the NABL accreditation certificate and scope of accreditation for real-time PCR for RNA viruses.

Separate information should be provided on each of the above component (i to vii). Detailed guidance on requirements for infrastructure and consumables for real-time RT-PCR Laboratory are placed at Annexure 2.

Interested Medical Colleges may apply to:

Dr. Nivedita Gupta, Scientist F, Division of Epidemiology & Communicable Diseases
Indian Council of Medical Research, Ansari Nagar, New Delhi

Applications should be accompanied with pictures of the laboratory infrastructure covering points i to iii and vi separately.

All applications should be submitted by email at: arvind.nccs@gmail.com and jitunarayan@gmail.com



SCIENCE AND ENGINEERING RESEARCH BOARD

Short-term Core Research Grant special call on COVID-19 (April 2, 2020)

Considering emerging health care requirements to combat the COVID-19 epidemic, SERB announces rapid / short-term projects in the following thrust areas, preferably with multidisciplinary efforts:

- Antiviral nanomaterials and bionano antiviral systems
- Drug repurposing against key COVID-19 targets
- Affordable, portable rapid diagnostic kits / tools
- Computational identification and validation of COVID-19 molecular targets
- In-vitro / clinical dose testing of nutritional supplements for immunity

Project duration should be up to 1 year with a maximum budget limit of Rs. 25 lakhs (including overhead). Proposals should be submitted through SERB online portal (www.serbonline.in) in Core Research Grant (CRG) format. Proposals will be initially screened for the competence of PI, suitability and scope prior to peer-review.

Projects concerning other pathogens will not be considered in this call.

Projects will be evaluated on first-come basis, with a last date of submission as April 30, 2020.

Contact Details:

Dr. T. Thangaradjou, Scientist E (All bio / bionano related Queries)

Email: ttradjou@serb.gov.in

Tel: 011-40000345 (availability subject to lockdown rules)

Dr. Arvind Chaudhary, Scientist C (All chemistry and nano related Queries)

Email: arvind@serb.gov.in

Tel: 011-40000381 (availability subject to lockdown rules)

Department of Science and Technology



Special Call under 'Science and Technology of Yoga and Meditation (SATYAM)' to fight against COVID-19 and other related viruses

The Department of Science and Technology invites concept note under 'Science and Technology of Yoga and Meditation (SATYAM)' for appropriate intervention of yoga and meditation to fight against COVID-19 and other similar kind of viruses. The aim of this special call is to provide assistance to our society in today's critical condition arises due to pandemic COVID-19. Since, this is a need based call; therefore, proposed work should be completed within 6-12 months. Teams of Scientists, clinicians and experienced practitioners of yoga and meditation who have proven track record in the field of yoga and meditation research are encouraged to submit concept note so that a large section of the society can be served with appropriate practices. The concept note should cover aims and objectives of proposed work, existing literature, methodology, expected outcome, budget requirement and details of host institutions along with detailed biodata of Principal Investigator with latest publications included in scientific journal databases.

Broad Themes: The project may address any one of the following themes:

- A. Improving immunity
- B. Improving respiratory system and interventions to overcome respiratory disorders like COPD etc.
- C. Stress, anxiety and depression related issues due to isolation, uncertainty, disruptions in normal life, etc.

The concept notes are invited in following categories:

1. Compilation of existing evidences
2. Development of protocols: The purpose will be, to develop specific protocols and modules of yoga and meditation in above mentioned areas based strictly on scientific approach with proper documentation. Existing protocols can also be refined or reframed in view of COVID-19.
3. Pilot study: Short duration pilot study can be proposed based on previous experience in above mentioned areas by a team of scientists, clinicians and practitioners. The study needs to be scientifically designed, documented, open to scrutiny and employ scientific tools for validation or falsification.

Project Duration and Budget: As this would be short term pilot projects to combat or mitigate the effect of COVID-19 in society, therefore, the project duration will be up to 12 months with a maximum budget of 15 lakhs.

Proposal of more than one year duration in related areas can be submitted in existing open call of SATYAM at e-PMS (onlinedst.gov.in).

Where to submit under this special call: **The concept note may be submitted at e-PMS (onlinedst.gov.in) till 30 April 2020** in 'SATYAM-Special Call'. A soft copy of concept note should also be emailed at vandana.singh@nic.in. There is no need to send hard copy of this proposal.

Note: Concept notes which are not related to above themes will not be considered. Investigators having on-going projects under SATYAM may also apply under this call.



XVII Convention of BRSI: International Conference on Biotechnology for Sustainable Agriculture, Environment and Health (BAEH-2020)



November 8-11, 2020 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/>

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