

2020

# समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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## डीआरडीई ने तैयार किया N-99 मास्क: इसकी एडवांस तकनीक करेगी संक्रमण से बचाव

*अतुल सक्सेना*

देश की चुनिंदा बायोसेफ्टी(biosafety) लैब(lab) में से एक ग्वालियर(gwalior) की DRDE ने अपनी तकनीक(technology) से एडवांस टेक्नोलॉजी(advance technology) वाला N -99 मास्क(mask) तैयार किया है। इसका निर्माण मुंबई(mumbai) और कोलकाता(kolkata) की दो कंपनियां(companies) कर रहीं हैं और इसके निर्माण में लगने वाला विशेष कपड़ा गुजरात(gujrat) की एक कंपनी तैयार कर रही है।



रक्षा मंत्रालय के रक्षा अनुसंधान एवं विकास संस्थान (DRDO) की ग्वालियर स्थित लैब रक्षा अनुसंधान एवं विकास स्थापना(DRDE) ने एक बार देश के हित में योगदान दिया है। कैमिकल(chemical) और बायोलॉजिकल(biological) हथियारों के खिलाफ लड़ने के लिए तकनीक विकसित करती है। जिसका उपयोग देश की सुरक्षा और खुफिया एजेंसियां करती हैं। देश में हुए कोरोना अटैक(corona attack) के बाद N-95 मास्क की आवश्यकता बढ़ गई। जिसके बाद भारत ने इसका निर्यात रोक दिया बावजूद इसके बढ़ते कोरोना संक्रमण से बचाव के लिए डॉक्टर्स और पैरामेडिकल स्टाफ सहित देश के नागरिकों के लिए मास्क की आवश्यकता पड़ रही थी। विशेषज्ञों ने सलाह दी कि केवल संक्रमित व्यक्ति और उसके संपर्क वाला व्यक्ति के लिए N-95 मास्क आवश्यक है शेष व्यक्ति कोई भी अन्य मास्क या कपड़ा लगा सकता है।

इस बीच रक्षा मंत्रालय का DRDO मास्क पर लगातार रिसर्च कर रहा था। DRDO की ग्वालियर स्थित लैब DRDE ने अलग अलग राज्यों से आये विभिन्न कंपनियों के 73 मास्क की रिपोर्ट बनाकर मंत्रालय भेज दी लेकिन किसी की फिल्ट्रेशन क्षमता 50प्रतिशत थी तो किसी की 80 प्रतिशत। ये क्षमता मास्क में प्रयोग किये गए फेब्रिक और मटेरियल के आधार पर जांची गई। इस बीच DRDE के वैज्ञानिकों ने अपनी तकनीक विकसित की और लगातार मेहनत के बाद एडवांस तकनीक वाला N-99 मास्क तैयार कर लिया। मास्क का परीक्षण कर लेने के बाद इसके निर्माण का रास्ता साफ हो गया। जानकारी के अनुसार रक्षा मंत्रालय की रिपोर्ट के बाद कपड़ा मंत्रालय मुंबई की वीनस और कोलकाता की इंटेक सेफ्टी कंपनी में इनका बल्क में निर्माण करा रहा है। खास बात ये है कि इस मास्क के लिए प्रयोग होने वाला विशेष कपड़ा गुजरात की अटीरा कंपनी में तैयार किया जा आ रहा है। विशेषज्ञ मानते हैं N-99 मास्क 99 प्रतिशत तक सुरक्षित है। इसको लगाने से डॉक्टर्स, पैरामेडिकल स्टाफ और कोरोना संक्रमित मरीज के सीधे संपर्क वाले लोग सुरक्षित रह सकेंगे। माना जा रहा है कि जल्दी ही ये मास्क राज्य सरकारों को उपलब्ध होगा और कोरोना वारियर्स इसका उपयोग कर सकेंगे।

<https://mpbreakingnews.in/breaking-news/drde-prepare-n-99-mask-its-advanced-technology-will-prevent-infection/>

## DRDO adapts two more bio-warfare technologies to fight Covid-19

*Technologies based on immunological detection, gene amplification being offered to private industry for development*

*By Vijay Mohan*

Chandigarh: The Defence Research and Development Organisation (DRDO) has adapted two more technologies developed for bio-warfare applications for detection of COVID-19 in humans.

DRDO sources said two technologies based on immunological detection and gene amplification are being offered to the private industry for development and fast-tracking commercial production.

This is in addition to technology and specifications for a host of other items made available to the industry by DRDO to help in the fight against COVID-19.

According to a senior scientist, the immunological detection technology for COVID-19 is based on the detection of certain types of antibodies present in the human bodies by using antigens.

An antigen is a toxin or other foreign substance which induces an immune response in the body, especially the production of antibodies. The SARS-CoV-2 antibodies present in the human test sample binds to the antigens and the reaction is then analysed through scientific processes to determine the presence of the virus.

The other technology is the “reverse transcription loop mediated isothermal amplification,” which scientists say, is a new generation innovative procedure that detects genomic viral RNA (Ribonucleic Acid) in human samples.

DRDO has listed over 43 items designed and developed by it that can be adapted or modified for use in the fight against COVID-19 and are open for manufacture by the private industry. These include personal protection gear, virus detection and neutralisation items, shelters, sanitisers and safety gadgets and medical equipment.

<https://www.tribuneindia.com/news/nation/drdo-adapts-two-more-bio-warfare-technologies-to-fight-covid-19-77080>

ज्ञान प्रसार एवम् विस्तार  
के 50 वर्ष

THE FINANCIAL EXPRESS

Tue, 28 April 2020

## Fight against Coronavirus: Critical LCA technology offered to the hospitals by DRDO

*Now, the MOP technology an offshoot of a critical system onboard Tejas utilizes Pressure Swing Adsorption (PSA) technique combined with molecular sieve technology to generate oxygen directly from atmospheric air*

*By Huma Siddiqui*

One of the spin-offs from a critical technology developed in India by the Defence Research and Development Organisation (DRDO) has now been offered to hospitals to fight COVID-19 — Medical Oxygen Plant (MOP) technology. Defence Bioengineering and Electro-medical Laboratory (DEBEL) a specialized lab of DRDO has developed onboard oxygen generation system (OBOGS) centric integrated life support system (ILSS) for indigenous Light Combat Aircraft



'Tejas'. This lab is more focused on the development of bio-medical and electro-medical soldier support systems.

Now, the MOP technology an offshoot of a critical system onboard Tejas utilizes Pressure Swing Adsorption (PSA) technique combined with molecular sieve technology to generate oxygen directly from atmospheric air.

This critical technology has got its safety certification agency CEMILAC and the oxygen generator components have been developed by DEBEL and technology has been transferred to a Coimbatore based firm.

According to Milind Kulshreshtha, C4I expert, "Establishing an ILSS technology in military aircraft is a niche area which DEBEL has been working on and the design of the system is planned to be versatile enough to be adaptable to fit on other fighter jets being flown by Indian Air Force (IAF)."

### Why the Specialized Oxygen System onboard 'Tejas'?

"The mid-air refuelling of aircraft requires enhanced pilot endurance too thus, a need to facilitate breathable oxygen for the pilot in the cockpit. Conventional systems like Liquid Oxygen (LOX) systems need to be replaced with an onboard generation of Oxygen. The OBOGS forms part of ILSS (Integrated Life Support System) for Tejas," explains Kulshreshtha.

### How does it work?

"The system is compactly designed to get integrated within the confined space on an aircraft and replaces Liquid Oxygen based system (LOX), which is based on liquid oxygen supply on board. The oxygen concentration in the breathing gas is detected using a solid-state oxygen sensor along with other sub-systems and supporting back-up mechanism. The integrated ILSS-OBOGS system forms part of a pilot's life support during emergency escape is," says Kulshreshtha.

According to DRDO, the OBOGS utilizes the bleed air from the aircraft engine by separating oxygen by a specialized process and oxygen of required aviation-grade purity is generated as long as the engine is operational.

### Where is this technology being used currently?

An Oxygen plant has been installed on some of the army sites on North East and Leh-Ladakh Region by the DRDO and has been operational since 2017. And the plant complies with international standards like ISO 1008, European, US and Indian Pharmacopeia.

### Role in fighting coronavirus?

This plant can be very useful in the hospitals located in urban and rural areas and will help in avoiding dependency on oxygen cylinders. Also, this will be more useful in remote and high altitude areas, as they are easy to transport, are low cost and will provide oxygen round the clock.

<https://www.financialexpress.com/defence/fight-against-coronavirus-critical-lca-technology-offered-to-the-hospitals-by-drdo/1941277/>



This lab is more focused on the development of bio-medical and electro-medical soldier support systems.



## **India needs robust bio-defence strategies against terror or natural outbreaks, say experts**

*By Rajat Pandit*

New Delhi: The jury is still out on the exact origin of Covid-19, even though both China and WHO contend it was not lab-made at Wuhan. But the pandemic has underscored like never before the need for India to be prepared for deadly bio-threats, whether they arise from natural outbreaks or bioterrorism.

Defence scientists and experts, in fact, warn that though the possibility of overt bio-warfare by a state is remote, the danger of non-state actors getting hold of virulent biological agents and unleashing them for “low-cost, high-impact strikes” in the country should not be discounted.

“India needs to prepare a comprehensive blueprint, with detailed action plans and strategies, on bio-threat preparedness, response, mitigation and restoration,” said Dr W Selvamurthy, a former chief controller in DRDO who led the CBRN (chemical, biological radiological and nuclear) defence programme.

A defence scientist, who did not want to be named, in turn, said the use of “biological or germ weapons” in the shape of bacteria, viruses, fungi or other toxic agents remains a clear and present threat.

“Terrorists can get hold of germ weapons, which can cause anthrax, plague, smallpox, botulism, Ebola, SARS and the like, from microbiological labs and other facilities. They will be like silent bombs nobody can detect. Biological weapons, in fact, are far more easier to obtain or develop than ‘dirty’ nuclear bombs,” he said.

India needs to prepare for bio-threats, whether accidental or planned, at both the military and civilian levels because they can be highly contagious and spread widely to disrupt national security and public health.

“A national mission mode program on mitigation of bio-threats should be launched, with an inter-ministerial steering committee and overall coordination under the national security advisor, because they can impact the nation’s comprehensive national security,” Dr Selvamurthy told TOI.

Noting that India has only one advanced Bio-Safety Level-4 (BSL-4) facility at the National Institute of Virology in Pune, he said at least five more such labs in different parts of the country for advanced R&D on the pathogens and genomic profiling were needed.

“We must have a central database of pathogens. There should be robust surveillance mechanisms, which would include development of nanotechnology-based bio-radars with sensor arrays for pathogens. All this should be backed by comprehensive containment, decontamination and restoration strategies,” added Dr Selvamurthy.

The country also needs properly-trained and well-equipped quick-reaction teams to handle virulent pathogens, as also other CBRN contingencies, stationed at different regional centres in the country.

While DRDO has developed a wide array of CBRN defence equipment for the armed forces over the years, ranging from nerve agent detectors, dosimeters and decontamination kits to integrated field shelters, respiratory masks and suits, it needs to focus on futuristic technologies for early detection and mitigation of such threats. “The urgent need to have strong bio-defence capabilities has been brought home by Covid-19,” said a Scientist.

<https://timesofindia.indiatimes.com/india/india-needs-robust-bio-defence-strategies-against-terror-or-natural-outbreaks-say-experts/articleshow/75399856.cms>



Tue, 28 April 2020

### COVID-19: भारत में तैयार हुआ कोरोना का अभेद्य कवच, DRDO ने भी किया टेस्ट में पास

*ये कोरोना वायरस महामारी से लड़ने में सहायक साबित होगा।*

नई दिल्ली: अंबाला के एक स्टार्टअप ने सोमवार को कहा कि उसने एक बिना बुना हुआ कपड़ा तैयार किया है, जो शरीर को ढंकने वाली पेशाक बनाने में उपयोगी है। इस कपड़े की मदद से चिकित्सा कर्मचारियों के संक्रमित होने का जोखिम बहुत कम हो जाएगा और ये कोरोना वायरस (Coronavirus) महामारी से लड़ने में सहायक साबित होगा।



इस कपड़े का विकास करने वाले एनयूएफएबी टेक्निकल टेक्सटाइल्स ने दावा किया है कि यह उत्पाद पूरी तरह अभेद्य है, और इससे अग्रणी मोर्चे पर काम कर रहे चिकित्साकर्मियों को संक्रमण के जोखिम को 90 प्रतिशत तक कम करने में मदद मिलेगी। कंपनी ने कहा कि इन मूल्यवर्धित कपड़ों को डीआरडीओ ने प्रमाणित किया है और ये शरीर को ढंकने वाली पेशाक बनाने में बहुत अधिक उपयोगी है। एनयूएफएबी के निदेशक सलिल गोयल ने कहा कि हमारी नई पेशाक एक विशेष उत्पाद है और ये डीआरडीओ से प्रमाणित है। ये संक्रमण की आशंका को काफी हद तक कम कर देता है।

बताते चलें कि कोरोना महामारी से बचाव के लिए सरकार ने कई तरीकों को अपना रखा है। इसमें पीपीई किट, मास्क, हैंड सैनिटाइजर इत्यादि शामिल हैं जिसका इस्तेमाल देशभर में कोरोना वॉरियर्स के साथ-साथ हर नागरिक भी कर है। इसके अलावा स्वास्थ्य मंत्रालय ने भी हेल्थ गाइडलाइन जारी की है जिसका इस्तेमाल आज पूरा देश कर रहा है।

<https://zeenews.india.com/hindi/india/covid-19-ambalas-startup-creates-infection-reducing-fabric-drdo-approved-in-test/673443>



Tue, 28 April 2020

### Ambala-based startup develops fabric to reduce infection risk among medical workers

New Delhi: An Ambala-based startup on Monday said it has developed a non-woven fabric useful in making coveralls which significantly reduces the risk of infection to medical workers and can be helpful in the fight against the coronavirus-related pandemic.



NUFAB Technical Textiles, which has developed the fabric, claims the product is impregnable, permeable and above all breathable, which will help frontline medical workers immensely by reducing the infection risk up to 90 per cent.

The value-added fabric is certified and approved by the DRDO and is extremely useful in making coveralls gowns - personal protection equipment used by health warriors, the company stated.

NUFAB Director Salil Goyal said, "Our new offering is a specialised product and is certified from the DRDO. Besides being light weight, the fabric is breathable and thus, reduces chances of infection substantially."

"The other benefit is that it is recyclable and eco-friendly," he added.

*(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)*

<https://www.outlookindia.com/newscroll/ambalabased-startup-develops-fabric-to-reduce-infection-risk-among-medical-workers/1816239>

## DRDO Technology



Tue, 28 April 2020

# 8 Years of Agni-V and way forward for India

*By Tushkar Shirodkar*

In 2012, in April 8 years ago, India had shocked the world by testing Agni-V and entering into elite ICBM Club with its range of over 5500km bringing all of China and much more within its strike envelope. Test placed India with a 5-member ICBM club which consists then of USA, Russia, China, France, and the UK.

Ability to strike targets in most of the Asia and European nations meant that many countries were nervous of the India newfound capabilities but harsh or severe critical criticism of the test never came from the western and European countries and even Chinese officials downplayed testing of Agni-V and called India a "Partner" in the region.

But no hold attack came from the Chinese media which not only slammed India but also called it "missile delusion" and Chinese mouthpiece like "Global Times" warned India against attempting "containment" of China with testing of the new missile. Chinese missile scientist and defense commentator called Agni-V range being fudged and said the missile has a range of at least 8000 km and not 5500 km as showcased to avoid western criticism by India.

Agni-V soon became the attention of the masses and was also showcased at the military parade but soon India realized that the missile is drawing unwanted attention from the friendly nations. first, it disappeared from the military parades, and then little or new pictures of the missile system was available and now severally limited to the public domain.

Since 2012, Agni-V has been tested Seven Times and Five times in canisterised version of the missile improving its road-mobility and also making it harder to be detected from the space. Indian media reports indicate that the missile system finally has entered limited scale production and is being deployed by Strategic Forces Command which is in charge to use them.



Since 2012, India has not announced any new land-based long-range missile program nor any successor to the Agni-V program leading to speculation that India might have decided to curb its long-range land-based missile program in favor of secretive long-range submarine-launched missiles to avoid upsetting many friendly nations in the neighborhood.

Agni-V if launched from the southern tip of India still will be able to strike Beijing and other major cities of China with a lighter payload and the need for longer-range land-based missiles also has been diminishing due to fear of them being attacked at launchpads or located while on road from satellites.

Since the first launch of Agni-V program, India has initiated K-5 SLBM program for its Nuclear Triad which will be equivalent to the Agni-V in terms of the range of 5000+ km and will be India's first ICBM for its underwater nuclear submarine force and according to media reports DRDO has been given clearance to also start work on the K-6 SLBM which will be India's first SLBM with Multiple independently targetable reentry vehicle (MIRVs) capabilities.

There has been unverified news also that the DRDO is also been tasked to enhance Agni-V range and capabilities without actually developing a successor program to the Agni-V to avoid heat from friendly nations. DRDO has been testing new propellant for the third stage section of the Agni-V program which could be to increase the range of the missile system and also to sustain better burn rate in flight. Agni V-A which is reported to be a derivative of the Agni-V is expected to feature multiple independently targetable reentry vehicle (MIRVs) capabilities with improved range.

*(Disclaimer: Articles published under "MY TAKE" are articles written by Guest Writers and Opinions expressed within this article are the personal opinions of the author. IDRW.ORG is not responsible for the accuracy, completeness, suitability, or validity of any information on this article. All information is provided on an as-is basis. The information, facts or opinions appearing in the article do not reflect the views of IDRW.ORG and IDRW.ORG does not assume any responsibility or liability for the same. Article is for information purposes only and not intended to constitute professional advice. Article by TUSHKAR SHIRODKAR, cannot be republished Partially or Full without consent from Writer or idrw.org)*

<https://idrw.org/8-years-of-agni-v-and-way-forward-for-india/#more-226032>

## COVID-19: Defence Forces Contribution

THE TIMES OF INDIA

Tue, 28 April 2020

### Indian Army develops remote-controlled trolley to deliver essential items

New Delhi: The Corps of Electronics and Mechanical Engineers (EME) of the Indian Army has created a remote-controlled vehicle to deliver essential items to frontline healthcare staff and others. In a Twitter post, the ADGPI Indian Army showcased several images of this remote operated trolley that comes equipped with a wash basin and dustbin. The trolley also has storage space which can be used in hospitals and isolation wards.

"Indian Army EME as part of anti-covid measures has innovated a remotely operated vehicle which can deliver essentials to personnel from 100 feet as part of social distancing," it said in the Twitter post.

The trolley looks basic and is improvised with electrical fittings to serve the purpose. "This will decrease human contact and chances of infection from spreading. We will fight COVID together," it said in another tweet.

The Indian Army recently also as developed low-cost innovations to help medical workers fight the coronavirus disease. Indian Army's official Twitter handle '@adgpi' tweeted that it has developed innovative surgical masks, hand sanitiser, anti-aerosolization box and thermal scanner. This comes after the Indian Navy made a unique design for ventilators that can cater to six patients. Dubbed as the Portable Multi-feed Oxygen Manifold, the device can cater to six people from a single oxygen cylinder.

Meanwhile, the Defence Research and Development Organisation (DRDO) has now tweaked fire fighting equipment into machines to spray disinfectants. These machines will be used to sanitise roads and other surfaces. Developed by the Centre for Fire Explosive & Environment Safety (CFEES), these machines are spin offs of fire suppressants.

These portable sanitation equipment can be used to spray decontamination solutions consisting of 1% Hypochlorite (HYPO) solution for sanitisation of suspected areas.

The DRDO has also made a bio-suit for medical professionals to help them fight coronavirus. Interestingly, the bio suit made by DRDO has a unique feature. The DRDO has prepared a special sealant as an alternative to seam sealing tape based on the sealant used in submarine applications, it said.

<https://timesofindia.indiatimes.com/gadgets-news/indian-army-develops-remote-controlled-trolley-to-deliver-essential-items/articleshow/75411115.cms>



**DEFENCE AVIATION POST**  
Your Connect To The World Of Defence And Aviation

Tue, 28 April 2020

## Armed Forces must remain safe from Covid-19 to help people: Bipin Rawat

Chief of Defence Staff (CDS) General Bipin Rawat said that the three Indian Armed forces must ensure that they are safe from COVID-19 so as to support people during these times. He said that all meetings have been taking place via video conferencing.

“As far as defence services are concerned, we do understand our responsibility that at this time when the nation is fighting against Covid-19 menace, the defence services must operate beyond the mandate and come to the support of our people and government in whatever way we can,” Rawat told a news agency in an interview.

“In order to do so, we have to first ensure that we remain safe from COVID-19 because if our own sailors, soldiers and airmen get affected by this virus, how are we going to support our people. That is why we have issued very strict directions on social distancing, wearing of masks and ensuring that people who require to be in quarantine remain in quarantine,” he added.





He said that the Director General Armed Forces Medical Services (DGAFMS) is regularly issuing directions.

“The medical directions are being regularly issued by our Director General Armed Forces Medical Services (DGAFMS) to ensure good health of our soldiers and airmen under these difficult times.”

There are 25 Indian Navy personnel and eight Army personnel including two doctors and one nursing who have so far tested positive for COVID-19. The reported cases are symptomatic and were traced to one sailor who tested positive on April 7, according to reports. Twenty sailors are from INS Angre, a shore establishment in Mumbai.

The navy men have been admitted in naval hospital INHS Asvini in Mumbai’s Colaba after testing positive for the novel coronavirus.

The CDS said all the directions from the PMO are percolating down from rank and file and that strict discipline and patience is vital during these times.

“We are attending meetings organised by the Cabinet Secretary and we are attending meetings of the Ministry of Health. Whatever directions are coming, are percolating down to the rank and file and we are ensuring that these reach in the right time and right manner. This is very important for us to maintain strict discipline and patience,” he said.

He said that armed forces personnel have downloaded the Aarogya Setu app and if anyone contracts the disease, health authorities can pick up the case and ensure that the spread does not happen.

<https://www.defenceaviationpost.com/2020/04/armed-forces-must-remain-safe-from-covid-19-to-help-people-bipin-rawat/>

 rissadiary.com

*Tue, 28 April 2020*

## **Indian Air Force stepped up its efforts toward fight against COVID-19**

New Delhi: Indian Air Force (IAF) has stepped up its efforts to meet all the emerging requirements of the Govt of India during the ongoing novel corona virus pandemic. IAF continues to airlift essential supplies of medicine and ration along with medical personnel within the country, to equip state governments and supporting agencies to combat the contagion effectively.

On 25 Apr 20, IAF’s transport aircraft landed at Lengpui Airport in Mizoram with 22 tonnes of medical supplies meant for combating Covid-19. The supplies were airlifted for the governments of Mizoram and Meghalaya. Till date, IAF has transported approximately 600 tonnes of medical equipment and support material.

A 15 member team of Armed Forces Medical Services (AFMS) Rapid Response had been sent to Kuwait on 11 Apr 20 in response to the request from state of Kuwait to the Govt of India. On completion of the task, the team was airlifted back from Kuwait in a C-130 aircraft of IAF on 25 Apr 20. During the return, a six-year old girl suffering from cancer, requiring immediate emergency surgery was also evacuated along with her father.



IAF continues to maintain op preparedness, while following all the guidelines issued by the Government of India ensuring social distancing measures to prevent the spread of the novel corona



virus in IAF work places. As the nation takes big strides in its fight to contain and defeat the contagion, IAF reaffirms its commitment to meet all emerging needs in a professional manner.

<https://orissadiary.com/indian-air-force-stepped-up-its-efforts-toward-fight-against-covid-19/>



*Tue, 28 April 2020*

## **Indian Navy readies three of its largest warships to move to Gulf to evacuate stranded Indians**

The Indian Navy has readied three of its largest warships to move to the Gulf to evacuate stranded Indians. The INS Jalashwa, an LPD or Landing Platform Dock— an amphibious warship— has been readied along with two LSTs or tank landing ships.

The government has asked these ships to be prepared to move within a few days. As they are large ships, particularly the INS Jalashwa, a huge number of people can be evacuated, if the option to send ships as opposed to Air India jumbos is taken. The Jalashwa, apart from its crew, can carry 1,000 troops and after social distancing, it translates to about 850 people.

The two LSTs are smaller (there are Kumbhir class ships) and can carry several hundred people apart from the crew. In fact, the Indian Navy has eight LSTs in Vizag, Port Blair and Cochin, but two are being refitted. Apart from the other two being readied, the other four LSTs are also to be readied.



If the ships are used, and it is an option the government is seriously considering, the sailing time to the Gulf is four to five days depending on which port the vessels are leaving from. If they have to pick up people from May 3-4, they would have to leave in two-three days.

The government's preliminary plan is to evacuate people who have "compelling reasons" to return like a family emergency, loss of jobs and the expiry of work permits, from the Gulf, where there are eight million Indians, South-east Asia, Central Asia and in smaller numbers, from Europe and the United States. The missions in these areas have been asked to "grade" people— people who need to return immediately will get preference.

A final decision by the government on evacuation is likely to be taken soon. But before that, ships and planes will have to be readied.

<https://idrw.org/indian-navy-readies-three-of-its-largest-warships-to-move-to-gulf-to-evacuate-stranded-indians/#more-226010>

# Wing Commander flies into the hearts of many with Praan Kavatch mantra to combat COVID-19

*By Anantha Krishnan M*

Bengaluru: A serving Wing Commander of the Indian Air Force (IAF) who has contributed immensely towards digital revolution over the years has impressed India's top military brass and bureaucrats with an idea that has the potential to find permanent healthcare solution to the world, now choking under the firm grip of coronavirus.

The idea also has captured the imagination of experts in multiple domains across the globe, driving them to come under one umbrella to take this voluntary idea to the logical end.



And, if they manage to break through the labyrinthine corridors of bureaucracy, then experts who have assessed its immediate potential say that we might have a firm solution on hand to tackle COVID-19 shocks and aftershocks.

And, what makes this application special is, it is developed to serve the people of India, with zero commercial angles.

The 'idea man' is Wing Commander Srmbikal Sudhakaran (44), an aeronautical engineer born and brought up in Coimbatore, with considerable experience in handling advance missile systems.

His peers say that Wg Cdr S Sudhakaran was part of the pioneer group of the prestigious AFNET project and was responsible for bringing up the first data centre of the IAF apart from designing multiple cuttingedge IT solutions before embarking on PraanKavatch.

(AFNET or Air Force Air Force Network is an IAF operated digital information grid on which the integrated air command and control system operates since 2010.)

This air warrior with brains looped deep into artificial intelligence (AI) domain seems to have extensively networked within the framework of IAF rules, to connect with people who had similar sentiments towards finding a unified solution to address COVID-19 threat.

Convinced by his idea named PraanKavatch (the digital shield for life) following his passionate call for volunteering on a professional platform during the lockdown period, many qualified domain experts flocked behind the air warrior with priceless inputs.

## **Digital Shield**

Drawing inspiration from Britain during World War-II, Wg Cdr Sudhakaran came up with the PraanKavatch project to solve three main problems to contain the effects of COVID-19 - to prevent the spread of the pandemic; to efficiently manage the complete lifecycle of those who are infected, and to ensure normalcy of life and economic activities as before.

PraanKavatch is a seamless one-button-click-solution which shall tell the user at every point of time what needs to be done, how, where and when.

It integrates not only technology solution modules but also aims to leverage the power of Aadhar and Ayushman Bharat Arogya Yojana along with the various existing healthcare policies.

## **How it works**

The PraanKavatch solution comprises of more than 20 digital modules and frameworks integrated into a singular platform to deliver various services.

It gives an end-to-end healthcare solution to any individuals who are affected by coronavirus and other routine healthcare problems.

It attempts to segregate the coronavirus patients from the non-corona ones by directing them to the respective healthcare centres digitally.

PraanKavatch is an integrated, converged digital solution based on AI and the people will be able to download it in the form of a mobile App.

The App will have stakeholders in healthcare including pharma retailers, hospitals, laboratories, testing and scanning centres to name a few.

Instant solution is delivered to the patient in the form of directions, guidance, appointments including medicine delivery.

### **Experts Confident**

Onmanorama interacted with several experts who are part of PraanKavatch from different parts of the world.

According to Uma Sudhindra, an entrepreneur based out of Bengaluru and a member of PraanKavatch think tank, to deal with any crisis it is critical to take a long-drawn approach, rather than an immediate response.

“This is a war and a war-like strategy must be applied to any tactical solution we design and implement. That is where PraanKavatch scores as a solution. It is meant not just for COVID-19, but as a digital solution for the management of the national healthcare database system,” says Uma, who is also on the board of IIM Visakhapatnam.

Her sentiments were echoed by another team member, who is a consulting professional with 10 years of experience in IT, strategy and risk analytics.

“PraanKavatch brings together different components of healthcare cycle and help people without putting others at risk. Being able to access doctors and healthcare professionals without leaving the confines of our homes will be a big factor in the days to come. As the lockdown period continues, health issues will arise. The design of this application ensures it can cater to all age groups,” she says, requesting to be anonymous owing to the contractual obligations with her firm.

Responding to a set of queries from Onmanorama, Air Vice Marshal C S Prakash (Retd) says that for a service officer, planning, preparation and execution of the war plan is a way of life.

“COVID-19 poses the same challenge and I am naturally drawn towards it as India needs to win this war with a plan that can be provided by PraanKavatch.

When asked what inspired him to join the team, the senior air warrior who retired this January after serving the IAF for 35 years, said that the dedication of his teammates sans any commercial angle was infectious.

“What convinced me is the multi-faceted approach to the challenge with the utilisation of minimal, available resources with maximised output,” says AVM Prakash, who was the Judge Advocate General (Air) from 2016 till January 2020.

Vidya Sagar, a retired senior scientist with Indian Space Research Organisation, with over three decades of exposure in multiple complex satellite technologies, says that COVID-19 is a multi-edge sword on everyone’s heads.

“PraanKavatch is hence a one-stop-shop to fight this pandemic, help to stabilize the plunging economy and putting an organized healthcare system in place. It could be much needed complete solution today, in this hour of need, which is not in place with the existing Apps,” says Vidya, who has worked on the power electronics and programme management areas of around 20 remote sensing satellites.

Air Commodore R N Gaekwad (Retd), who was a Network Centric Warfare expert with IAF, says that PraanKavatch is different for a simple reason that it is conceptualized to do what other applications are not doing.

“It’s a global emergency the answer lies in finding a technology-based architecture which will synergise all the individual efforts and channelize them in one direction with a sole aim of finding an answer in quick time. PraanKavatch when combined with other applications, will help us fight the pandemic in a focused manner both in terms of providing effective medical services as well as



start revival of the economy,” says Air Cmde Gaekwad (Retd), a fighter pilot who served the IAF for 34 years.

Anushree Bordia, a Senior Application Specialist working with Cedars Sinai in Los Angeles, in her communication to Onmanorama said that PraanKavatch can be a solution accessible to the masses.

When asked what prompted her to chip in with her expertise, she said: “Everyone is looking to come back to our old normal and in the current state this seems a distant dream. PraanKavatch has the technology and the idea of combating it efficiently without bringing much disturbance in everyone's life,” says Anushree, who has over a decade of experience as in IT and health care industry.

Mukund Kulkarni, a Senior Software Developer working with one of the top Fortune 100 companies and currently based out of Dallas, says PraanKavatch offers a holistic approach for all the tools that ideally an organization or country would need it for its citizens to battle the pandemic.

“Since it is being developed keeping in mind India specific needs, it is effective, and its use could prove a lot of positive consequences for the people in the coming days. Praan Kavatch is not a competitor to any of the Apps or applications developed by state governments or Centre. It could very well play a role to complement or even work as a better alternative for features which are already working well for the population,” says Mukund, who like others joined the bandwagon seeing its purpose and non-commercial intentions.

#### **Where it stands**

This digital revolution for healthcare in India has already seen support from CDAC (Centre for Advanced Computing), CISCO while IIT-Guwahati has stamped its approval on the project design, which was ratified by senior scientists from Department of Science and Technology.

The Chief of Defence Staff Gen Bipin Rawat along with other senior officials are said to have been convinced with the idea of PraanKavatch to combat a pandemic like COVID-19.

As this piece is being published, the detailed project proposal has been sent to the office of Principal Scientific Advisor (PSA) to the Government of India for evaluation. The PraanKavatch team is hoping to meet PSA Prof K Vijay Raghavan with a formal presentation soon.

#### **Road Ahead**

With multiple digital applications promising solutions post the outbreak of this pandemic, PraanKavatch probably could be an aggregator with an ambitious design and embedded with military-grade security features, putting to rest privacy and surveillance related fears.

The Green move protocol of PraanKavatch is a unique solution developed by Indian software professionals which can continually update the health status of every moving individual in real-time. The solution aims to achieve lockdown-free economy in 28 days if the guidelines are followed in letter and spirit.

“PraanKavatch project is an attempt to turn this moment of crisis into an opportunity to transform India's healthcare. It's a voluntary, crowd-sourced mission of compatible professionals with a vision for digitising India's healthcare ecosystem,” says a team member.

(The writer is an independent aerospace and defence journalist, who blogs at Tarmak007 and tweets@writetake)

<https://english.manoramaonline.com/news/nation/2020/04/28/praan-kavatch-an-iaf-commanders-project-against-coronavirus.html>

## Business Standard

Tue, 28 April 2020

### India jumps to third rank in global military expenditure, shows study

*Spending grows 6.8% to \$71.1 billion in 2019, outpacing Russia and Saudi Arabia*

London: Global military expenditure growth at 3.6 per cent saw its largest annual spike in a decade in 2019 with China and India being the second- and third-largest spenders, after the US, a Stockholm-based think-tank said on Monday. It's the first time that the two Asian giants were among the top three countries spending more on armaments.

The total global military expenditure rose to \$1,917 billion in 2019, representing an annual growth of 3.6 per cent compared to 2018, according to a new report by the Stockholm International Peace Research Institute (SIPRI).

The 3.6 per cent spike it said was the largest spending growth since 2010.

While the US drove the global growth, China and India — the top Asian military spenders — were respectively the second- and third-largest military spenders in the world, the report said.

China's military expenditure reached \$261 billion in 2019, a 5.1 per cent increase compared to 2018, while that of India grew by 6.8 per cent to \$71.1 billion, it said.

"India's tensions and rivalry with both Pakistan and China are among the major drivers for its increased military spending," said Siemon T Wezeman, SIPRI senior researcher.

The total global military expenditure in 2019 represents an increase of 3.6 per cent from 2018 and the largest annual growth in spending since 2010, it said.

The five largest spenders, which accounted for 62 per cent of the total expenditure, were the US, China, India, Russia and Saudi Arabia, the report said, adding that this is the first time that two Asian states have featured among the top three military spenders.

In addition to China and India, Japan (\$47.6 billion) and South Korea (\$43.9 billion) were the largest military spenders in Asia and Oceania. Military expenditure in the region has risen every year since at least 1989.

The report said that the military spending by the US grew by 5.3 per cent to a total of \$732 billion in 2019 and accounted for 38 per cent of global military spending. The increase in US spending in 2019 alone was equivalent to the entirety of Germany's military expenditure for that year.

"The recent growth in US military spending is largely based on a perceived return to competition between the great powers," said Pieter D Wezeman, senior researcher at SIPRI.

The global military spending in 2019 represented 2.2 per cent of the global gross domestic product (GDP), which equates to approximately \$249 per person.



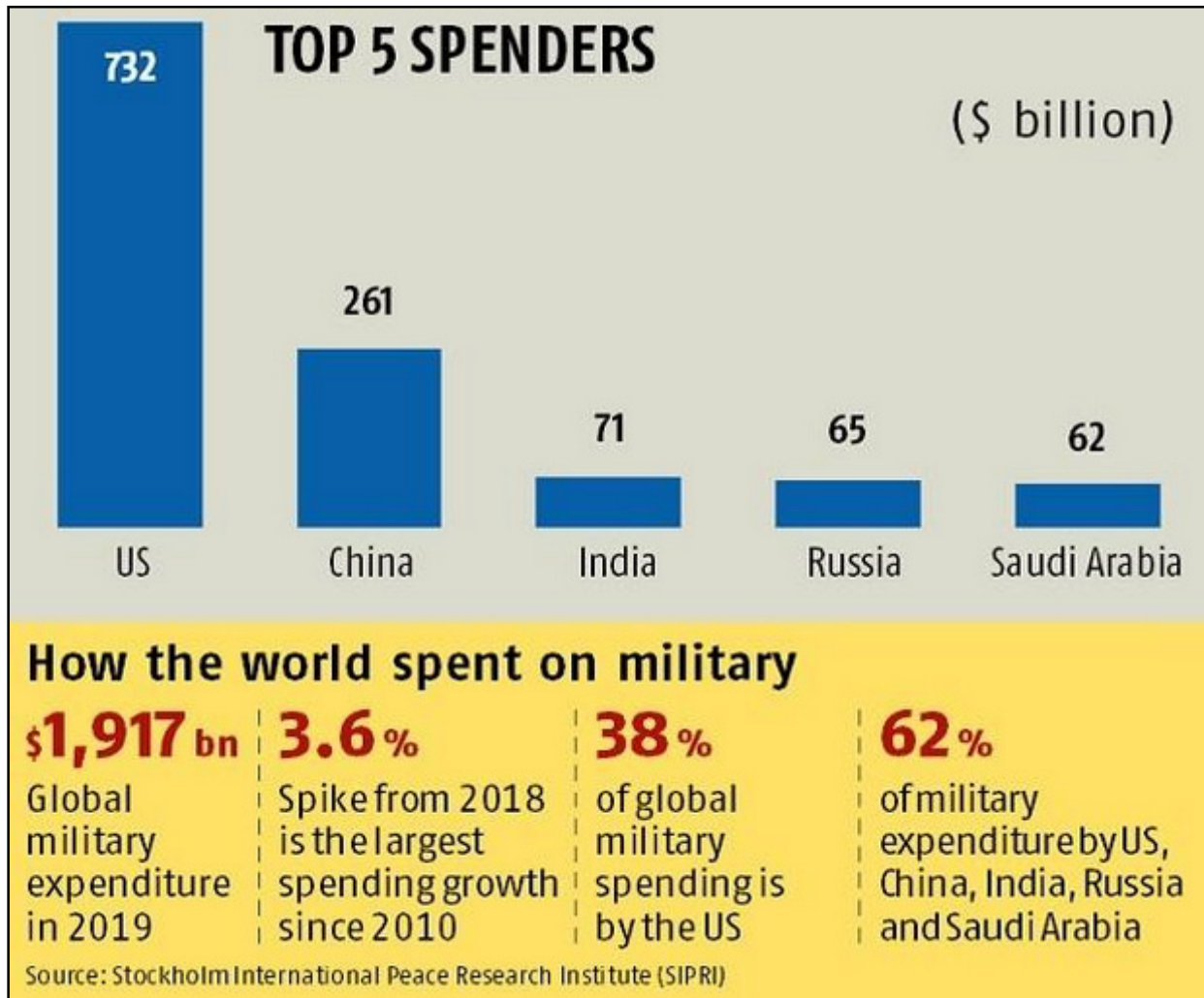
While the US drove the global growth, China and India — the top Asian military spenders — were respectively the second- and third-largest military spenders in the world, the report said.

“Global military expenditure was 7.2 per cent higher in 2019 than it was in 2010, showing a trend that military spending growth has accelerated in recent years,” said Dr Nan Tian, SIPRI Researcher.

“This is the highest level of spending since the 2008 global financial crisis and probably represents a peak in expenditure,” the researcher said.

In Europe, Germany’s military spending rose by 10 per cent in 2019, to \$49.3 billion, the largest increase in spending among the top 15 military spenders in 2019.

“The growth in German military spending can partly be explained by the perception of an increased threat from Russia, shared by many North Atlantic Treaty Organization (NATO) member states. At the same time, however, military spending by France and the United Kingdom remained relatively stable,” said Diego Lopes da Silva, Researcher at SIPRI.



In 2019, Russia was the fourth-largest spender in the world and increased its military expenditure by 4.5 per cent to \$65.1 billion.

“At 3.9 per cent of its GDP, Russia’s military spending burden was among the highest in Europe in 2019,” said Alexandra Kuimova, researcher at SIPRI. The average military spending burden was 1.4 per cent of the GDP for countries in the Americas, 1.6 per cent for Africa, 1.7 per cent for Asia and Oceania and for Europe, and 4.5 per cent for the Middle East (in countries for which data is available).

SIPRI said that data from previous global economic downturns suggests that the economic crisis resulting from the coronavirus pandemic will probably disrupt the future military spending.

[https://www.business-standard.com/article/defence/india-jumps-to-third-rank-in-global-military-expenditure-shows-study-12004280032\\_1.html](https://www.business-standard.com/article/defence/india-jumps-to-third-rank-in-global-military-expenditure-shows-study-12004280032_1.html)





*Tue, 28 April 2020*

## **India third after China, US in military spending amid heightened border tension**

New Delhi: Arch rivals India and China, who share a 4,057 kilometre border, are among top military spenders in 2019, according the data released by an international think tank. The year 2019 witnessed a 3.6 percent increase in global military spending at \$1,917 billion, which is the largest annual growth since 2010.

China and India, which spent \$261 billion (up 5.1%) and \$71.1 billion (up 6.8 percent) in 2019 on their militaries, respectively, are the second- and third-biggest military spenders in the world after the United States, which spent \$732 billion on defence, the Stockholm International Peace Research Institute (SIPRI) said in data released on Monday.

It is for the first time that two Asian countries are among the top three in terms of military expenditures. However, senior researcher at SIPRI Siemon T. Wezeman has credited India's tensions and rivalry with both Pakistan and China as the "major drivers for its increased military spending".

The SIPRI report revealed that India's archrival Pakistan's military expenditure rose 70 percent over the last decade to reach \$10.3 billion; India's military spending over the same period of time increased 37 percent. Despite worsening financial conditions, Pakistan's military burden increased from 3.4 percent of GDP in 2010 to 4.0 percent in 2019 while India's military burden decreased to 2.4 percent from 2.7 over the course of the decade.

India shares a 4,057 kilometre-long border with China and a 3,323-kilometre border with Pakistan. Indian Navy Chief Admiral Karambir Singh, in response to China's growing emphasis on its navy, had said that the Indian Navy has to see how it can match China's "intent", given its limited budget and resources.

The Navy Chief highlighted China's increased presence in the Indian Ocean Region, with six to eight warships in the area at any given time and added that its relations with Pakistan continue to pose a threat to India. However, even with the gap of about \$200 billion between India's military spending and that of China, it has proven its preparedness against its rival time and again.

Earlier this month, during the movement of a Chinese aircraft carrier and warships through the Miyako Strait as part of a journey to the South China Sea, the Indian Navy asserted its war preparedness, stating that it will continue to maintain an operational vigil in the Indian Ocean Region by carrying out regular maritime surveillance missions.

In January, India began deployment of advanced weapons systems and improving its infrastructure along its border with China. In the backdrop of increasing military relations between China and Pakistan and fearing collusion from both, Indian's army chief had justified deployment at the world's highest battlefield, Siachen, as crucial for the Indian Army.

<https://sputniknews.com/military/202004271079105394-india-third-after-china-us-in-military-spending-amid-heightened-border-tension/>

## With flights grounded, Navy begins runway maintenance

By Newton Sequeira

Panaji: Taking advantage of the suspension of flights due to the coronavirus lockdown, the Indian Navy has commenced maintenance and repairs of the runway at the Goa International Airport at Dabolim.

The maintenance activity, being done by the Military Engineer Services (MES), will continue till May 7, officials said. "INS Hansa has issued a notice to airmen (NOTAM) informing about closure of the runway till May 7," Goa airport director Gagan Malik said.

The repairs, which began on April 25, have been going on even as the navy and Airports Authority of India coordinate international relief flights which are evacuating foreign nationals who are stranded in Goa due to the lockdown.

Till date, 33 international rescue flights have airlifted 6416 foreigners along with 58 infants from Goa, said Malik.

High frequency operations and heavy monsoons have deteriorated the runway, necessitating periodic repairs. Now, with domestic and international flights suspended, the navy has decided to strengthen the lone runway which serves civilian as well as military flights.

According to the NOTAM, currently the maintenance work is being done in the afternoon, from 2pm to 7pm. From May 1, the work will be undertaken from 6.30am to 12.30pm.

"This is regular pre-monsoon maintenance to ensure the health of the runway and to prevent foreign object damage to the aircraft engines. During the monsoons if there is any damage then no repairs can be done," said a naval official.

For flight safety reasons, the runway requires regular attention and maintenance from drainage clearing to resurfacing of broken patches.

Runway markings also need to be visible during the monsoons, when visibility drops due to heavy rainfall, said a source.

During regular operations, civilian flights are allowed to land throughout the day except for a six hour block during weekdays and for 24 hours on weekends. This leaves very little time for repairs, officials said.

In September last year, the Indian Navy had proposed to close the runway for arrivals and departures for six hours every Saturday for maintenance. But since the move coincided with the charter flight season, the maintenance time was reduced.

Along with the runway, the taxiway and other movement areas are being repaired based on requirements.

### Fresh consignment of med supplies reaches state

A second Lifeline Udan flight landed at Goa International Airport on Monday carrying a consignment of medical supplies for the state. Weighing about 714 kg, and packed in 50 boxes, the supplies included safety goggles, PPE, masks and other equipment requested by the directorate of health services. The consignment was brought by an Alliance Air ATR 72. The Airports Authority of India (AAI) handled the unloading of the cargo and facilitated a quick turnaround of the aircraft for its next leg.

<https://timesofindia.indiatimes.com/city/goa/with-flights-grounded-navy-begins-runway-maintenance/articleshow/75417462.cms>



Tue, 28 April 2020

## Pakistan Army's "Green Book" confirms India's missile threats to secure Abhinandan

By Anand SG

In the latest edition of the Pakistan Army's Green Book 2020, In an essay written by Dr. Maria Sultan where she has confirmed what was reported on Indian media post-capture of Wing Commander Abhinandan Varthaman that India had deputed Surface to Surface missiles and had threatened to escalate the situation if the Mig-21 Pilot was not returned to India.

Varthaman who was in Pakistani custody for 60 hours and according to Indian media reports, India's External Intelligence agency Research and Analysis Wing had called up his Pakistani counterparts in Inter-Services Intelligence (ISI) and had warned about retaliation if the Abhinandan was not handed over to India soon.



According to Indian media reports, the Indian Army had moved 12 Surface to Surface BrahMos cruise missile Battery close to the border in the Rajasthan sector, some in the Indian OSNIT community had seen similar movement near Line of Control. According to Research and Analysis Wing, Pakistan's Military and ISI were planning to use captured Pilot to further humiliate him in National media and also use him as a bargaining chip with India to secure his realize.

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<https://idrw.org/pakistan-armys-green-book-confirms-indias-missile-threats-to-secure-abhinandan/#more-225978>



Tue, 28 April 2020

## Elbit Systems gets EW contracts from Indian air force

Israeli defense contractor Elbit Systems said on Sunday it won a contract worth about \$103 million to supply electronic warfare (EW) suites allegedly for Indian air force.



The contract will be carried out over three years and includes long-term integrated logistic support.

Under the contract, Elbit Systems will fit the customer's helicopters with complete EW suites, including countermeasure systems.

"Demand for combat-proven EW systems is getting stronger as the electro-magnetic spectrum becomes increasingly contested and the threat to aircraft gets more acute," said Edgar Maimon, general manager of Elbit Systems EW.

<https://idrw.org/elbit-systems-gets-ew-contracts-from-indian-air-force/>



Tue, 28 April 2020

## Indian Navy's P-8I Maritime aircraft potent hunters to get deadly Harpoon missiles

*With the integration of these air launched anti-ship missiles, the P-8I shall be able to engage and destroy hostile surface warships of choice, even while they form a part of a Task Force unit*

*By Huma Siddiqui*

The Trump administration has recently put its stamp of approval on the sale of ten AGM-84L Harpoon Block II air-launched missiles, including the complete maintenance support package and training to integrate them with P-8I aircraft. With the integration of these air launched anti-ship missiles, the P-8I shall be able to engage and destroy hostile surface warships of choice, even while they form a part of a Task Force unit.

"The AGM-84L is a solid propellant well tested sea-skimming missile with a range of 67 nautical miles and shall enable the Indian Navy to undertake Airborne maritime surface target engagement tactics more effectively. A missile with the destructive power of AGM-84L Harpoon capability fitted on an advance aircraft like P-8I shall surely improve India's response to any hostile presence lurking within India's maritime area of interest,"

Milind Kulshreshtha, C4I expert says.

The delivery of the follow-on order for four additional aircraft which was placed in 2016 was to commence in July.

Though, not yet formally confirmed by Boeing officials, with the US also locked down, the delivery schedule could be pushed back a little.

### Role of P-8I Maritime Patrol Aircrafts

The P-8I aircraft have been acknowledged as an advanced airborne platform by Indian Navy, and a force multiplier with its in-built inter-operability capabilities.

"This makes P-8I a multi-mission aircraft with C4I ingrained within its Concept of Operations, a dedicated tactical data link fully supporting it in the inter-operability features. In 2018, the two countries had signed the Communications, Compatibility and Security Agreement (COMCASA) which enabled interoperability between the US and Indian defence forces, including the P-8I and US, operated P-8A fleets. This means, now the two P-8 variants can share the Common Operation



The P-8I aircraft have been acknowledged as an advanced airborne platform by Indian Navy, and a force multiplier with its in-built inter-operability capabilities. (Photo Credit: Boeing Company)

Picture (COP) in real-time to plan and execute missions as per this tactical picture to improve the resource effectiveness,” the C4I expert explains.

The primary designed role of the P-8I aircraft is to provide airborne Anti-submarine Warfare (ASW) capability to Indian Navy, to detect unknown submarines and ships lurking within India’s area of interest.

“The aircraft is capable of launching submarine detection sonobuoys (active and passive) and can deploy more than hundred sonobuoys as part of ASW operations. During the Fleet operations, P-8I ASW aircraft forms an important component for protecting the Task Force assets, especially from any type of submarine attack and it forms a barrier screen around the main Task Force. The radius of this ASW screen is computed by aircrafts onboard Command and Control system based on various factors like hostile submarine torpedo ranges and disposition of own assets. The intent is to detect and neutralize any hostile submarine before it launches a torpedo. For this, the P8I can not only detect the target but can classify and attack it too by using onboard torpedoes and depth charges,” he adds.

### **Role Enhancement of P-8I Fleet**

The initial P-8I aircraft which have arrived in India since 2013 are equipped with long-range Anti Submarine Warfare (ASW) suite, Anti-surface Warfare and ISR (Intelligence, Surveillance and Reconnaissance) systems and also had indigenous components fitted as part of communication and sensor suite.

The Boeing’s P-8 series aircraft were already designed to carry four Harpoon missiles and five torpedoes in an offensive role. However, the AGM-84L Harpoon anti-ship missiles did not form part of P-8I aircraft complement to Indian Navy.

“Now, with US Government clearing the sales of these anti-ship Harpoon missiles, India is in a position to go ahead to process a formal Supply Order to procure these missiles. With the augmentation of Surface Warfare feature with airborne threat engagement capability, India’s adversaries too shall be required to change their own covert data-gathering missions within the country’s area of interest,” he opines.

Keeping in view the forthcoming budget constraints to procure military hardware, augmenting and enhancing features to fully utilize each seaborne or airborne military platform should be the mantra for India to achieve future military dominance.

<https://www.financialexpress.com/defence/indian-navys-p-8i-maritime-aircraft-potent-hunters-to-get-deadly-harpoon-missiles/1941068/>

ज्ञान प्रसार एवम् विस्तार  
ये एव सर्वे  
**THE HINDU**

Tue, 28 April 2020

## **Coronavirus lockdown | HAL allowed to resume work from Tuesday with fewer staff**

*HAL halted work around a month back under a nationwide lockdown imposed to check the COVID-19 pandemic*

Bengaluru: The Ministry of Home Affairs has allowed Hindustan Aeronautics Ltd. (HAL) to resume manufacturing operations as an essential defence service from Tuesday (April 28), but with curtailed staff and under strict safety guidelines.

HAL halted work around a month back under a nationwide lockdown imposed to check the COVID-19 pandemic.

Among the first few to be picking up work again, the state-owned defence aircraft company returns to conditional activities in two shifts (normally it works in three shifts). Each shift may have up to 50% of its manpower.



Employees have been asked to commute to work on their own, according to an official letter dated April 27.

"Divisions/ offices may resume normal operations/ work with effect from 28.4.20 in two shifts (8 hours each)," the letter said. .

HAL manufactures and services military planes and helicopters mainly for the Indian Air Force across multiple locations. It has been cleared 'on a par with defence' to resume work as it provides essential services to keep the IAF operationally ready.

It has been advised to follow standard advisories of the Centre and the State during the lockdown period, such as screening of staff and contract workers at the entrance, keeping social distance among employees, hand sanitisation, personal hygiene and wearing of masks.

Since March 24, HAL, as with all private and public sector companies, allowed only minimum essential staff for maintenance.

<https://www.thehindu.com/news/national/coronavirus-lockdown-hal-allowed-to-resume-work-from-tuesday-with-fewer-staff/article31449355.ece>



HAL manufactures and services military planes and helicopters mainly for the Indian Air Force across multiple locations

## Science & Technology



Tue, 28 April 2020

## Airbus to develop thermal instrument to support Franco-Indian climate satellites

Airbus Defence and Space has entered an agreement with the French Space Agency, Centre National d'Etudes Spatiales (CNES), to develop a thermal instrument for the TRISHNA satellite which will monitor climate change. TRISHNA will be the latest satellite in the joint Franco-Indian satellite fleet dedicated to climate monitoring and operational applications – in order to develop an observation system with high thermal resolution CNES and Indian Space Research Organisation (ISRO) have joined forces.

Observations from the new satellite are expected to enhance the understanding of the water cycle, improve management of the planet's water resources and better define the impacts of climate change, especially at local levels.

Jean-Marc Nasr, Head of Space Systems at Airbus, said: "France's world-leading expertise in the Earth observation export market, combined with the unmatched efficiency and ambition of the Indian Space industry is going to bring thermal infrared imagery to a new level."





“This will enable breakthrough applications in agriculture, urban and coastal zone management, meteorology, climate science and many commercial applications.”

<https://idr.w.org/airbus-to-develop-thermal-instrument-to-support-franco-indian-climate-satellite/#more-226007>



Tue, 28 April 2020

## Scientists unveil how general anesthesia works

*A study in mice and rat brains reveals how general anesthesia dampens high frequency brain activity by weakening synapses*

Hailed as one of the most important medical advances, the discovery of general anesthetics - compounds which induce unconsciousness, prevent control of movement and block pain - helped transform dangerous and traumatic operations into safe and routine surgery. But despite their importance, scientists still don't understand exactly how general anesthetics work.

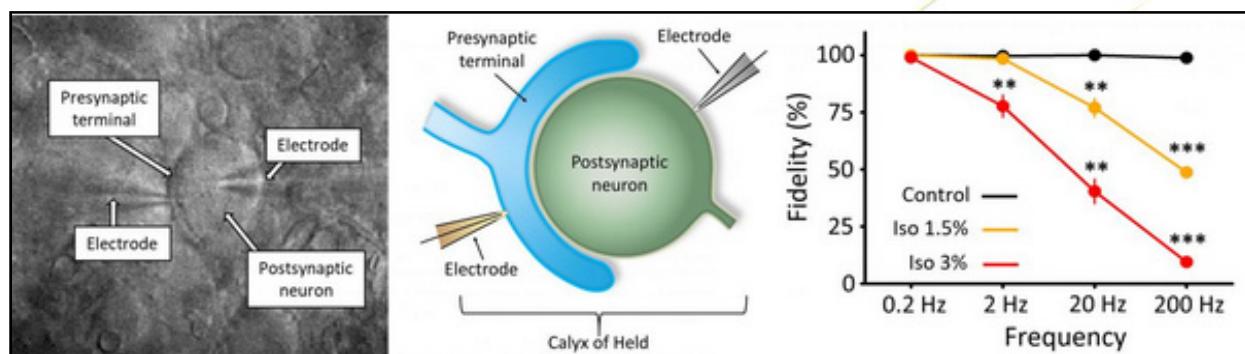


IMAGE: The large size of the calyx of Held allows scientists to visualize and manipulate the synapse. The electrodes touching the neurons can be used to evoke and record electrical signals.... view more

Now, in a study published this week in the *Journal of Neuroscience*, researchers from the Okinawa Institute of Science and Technology Graduate University (OIST) and Nagoya University have revealed how a commonly used general anesthetic called isoflurane weakens the transmission of electrical signals between neurons, at junctions called synapses.

"Importantly, we found that isoflurane did not block the transmission of all electrical signals equally; the anesthetic had the strongest effect on higher frequency impulses that are required for functions such as cognition or movement, whilst it had minimal effect on low frequency impulses that control life-supporting functions, such as breathing," said Professor Tomoyuki Takahashi, who leads the Cellular and Molecular Synaptic Function (CMSF) Unit at OIST. "This explains how isoflurane is able to cause anesthesia, by preferentially blocking the high frequency signals."

At synapses, signals are sent by presynaptic neurons and received by postsynaptic neurons. At most synapses, communication occurs via chemical messengers - or neurotransmitters.

When an electrical nerve impulse, or action potential, arrives at the end of the presynaptic neuron, this causes synaptic vesicles - tiny membrane 'packets' that contain neurotransmitters - to fuse with the terminal membrane, releasing the neurotransmitters into the gap between neurons. When enough neurotransmitters are sensed by the postsynaptic neuron, this triggers a new action potential in the post-synaptic neuron.

The CMSF unit used rat brain slices to study a giant synapse called the calyx of Held. The scientists induced electrical signals at different frequencies and then detected the action potentials generated in the postsynaptic neuron. They found that as they increased the frequency of electrical signals, isoflurane had a stronger effect on blocking transmission.

To corroborate his unit's findings, Takahashi reached out to Dr. Takayuki Yamashita, a researcher from Nagoya University who conducted experiments on synapses, called cortico-cortical synapses, in the brains of living mice.

Yamashita found that the anesthetic affected cortico-cortical synapses in a similar way to the calyx of Held. When the mice were anesthetized using isoflurane, high frequency transmission was strongly reduced whilst there was less effect on low frequency transmission.

"These experiments both confirmed how isoflurane acts as a general anesthetic," said Takahashi. "But we wanted to understand what underlying mechanisms isoflurane targets to weaken synapses in this frequency-dependent manner."

### **Tracking down the targets**

With further research, the researchers found that isoflurane reduced the amount of neurotransmitter released, by both lowering the probability of the vesicles being released and by reducing the maximum number of vesicles able to be released at a time.

The scientists therefore examined whether isoflurane affected calcium ion channels, which are key in the process of vesicle release. When action potentials arrive at the presynaptic terminal, calcium ion channels in the membrane open, allowing calcium ions to flood in. Synaptic vesicles then detect this rise in calcium, and they fuse with the membrane. The researchers found that isoflurane lowered calcium influx by blocking calcium ion channels, which in turn reduced the probability of vesicle release.

"However, this mechanism alone could not explain how isoflurane reduces the number of releasable vesicles, or the frequency-dependent nature of isoflurane's effect," said Takahashi.

The scientists hypothesized that isoflurane could reduce the number of releasable vesicles by either directly blocking the process of vesicle release by exocytosis, or by indirectly blocking vesicle recycling, where vesicles are reformed by endocytosis and then refilled with neurotransmitter, ready to be released again.

By electrically measuring the changes in the surface area of the presynaptic terminal membrane, which is increased by exocytosis and decreased by endocytosis, the scientists concluded that isoflurane only affected vesicle release by exocytosis, likely by blocking exocytic machinery.

"Crucially, we found that this block only had a major effect on high frequency signals, suggesting that this block on exocytic machinery is the key to isoflurane's anesthetizing effect," said Takahashi.

The scientists proposed that high frequency action potentials trigger such a massive influx of calcium into the presynaptic terminal that isoflurane cannot effectively reduce the calcium concentration. Synaptic strength is therefore weakened predominantly by the direct block of exocytic machinery rather than a reduced probability of vesicle release.

Meanwhile, low frequency impulses trigger less exocytosis, so isoflurane's block on exocytic machinery has little effect. Although isoflurane effectively reduces entry of calcium into the presynaptic terminal, lowering the probability of vesicle release, by itself, is not powerful enough to block postsynaptic action potentials at the calyx of Held and has only a minor effect in cortico-cortical synapses. Low frequency transmission is therefore maintained.

Overall, the series of experiments provide compelling evidence to how isoflurane weakens synapses to induce anesthesia.

"Now that we have established techniques of manipulating and deciphering presynaptic mechanisms, we are ready to apply these techniques to tougher questions, such as presynaptic mechanisms underlying symptoms of neurodegenerative diseases," said Takahashi. "That will be our next challenge."

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[https://eurekalert.org/pub\\_releases/2020-04/oios-suh042720.php](https://eurekalert.org/pub_releases/2020-04/oios-suh042720.php)

## It takes a neutron beam to find a proton

**Researchers from Osaka University use neutron crystallography to pinpoint hydrogen atoms and protons in the structure of a large enzyme and reveal previously unreported behavior**

Osaka: Understanding the behavior of proteins and enzymes is key to unlocking the secrets of biological processes. The atomic structures of proteins are generally investigated using X-ray crystallography; however, the precise information for hydrogen atoms and protons (hydrogen ions) is usually unattainable. Now a team including Osaka University, Osaka Medical College, National Institutes for Quantum and Radiological Science and Technology, Ibaraki University, and University of Tsukuba has used neutron crystallography to reveal high-resolution structural details of a very large oxidase protein. Their findings are published in *PNAS*.

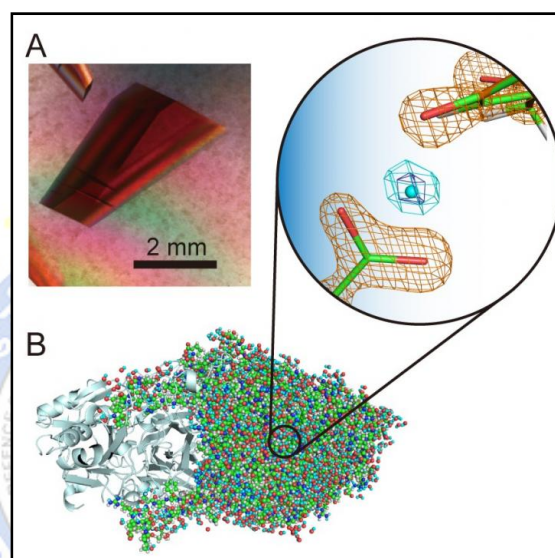
The hydrogen atoms and protons that make up about half of the atoms in proteins and enzymes often play crucial roles in the jobs these biomolecules do; however, their exact positions are difficult to pinpoint because of their small size. The most common approach for working out the structure of a protein is to direct a beam of high-energy X-rays at a protein crystal and analyze the diffraction pattern that results from the interactions of the X-rays with the electrons of atoms in the structure. Unfortunately, X-rays do not interact strongly with hydrogen atoms or protons, which have low or no electron density, making them difficult to "see."

One solution is to apply a neutron beam to the crystal instead of X-rays. Neutrons interact with the nuclei of the atoms in their path, including those of hydrogen atoms and protons, despite them being small. The diffraction patterns resulting from these interactions are recorded after the neutron beam has passed through the crystal, and are decoded into the precise locations of the nuclei, including the hydrogen nuclei.

"Hydrogen atoms and protons are particularly interesting components of enzyme structures because they can exhibit quantum behaviors that have recently been found to be crucial to enzyme function. It is therefore important to accurately determine their locations in the protein structure in order to unravel what is happening," study corresponding author Toshihide Okajima explains. "Using neutron crystallography, we were able to determine the structure of a bacterial copper amine oxidase with a molecular weight of 70,600--which is extremely large for neutron crystallography and significantly exceeds previously recorded molecular masses--and still precisely locate the hydrogen atoms and protons in the structure. An unusual "levitated" proton was observed between a cofactor, topa quinone, and an amino acid residue strictly conserved in this class of enzymes."

The topa quinone cofactor covalently bound to the enzyme plays an essential role in the catalytic function. The researchers were finally able to establish a complete picture of topa quinone 30 years after its discovery as a protein-derived cofactor. They found that the cofactor actually exists in equilibrium between two different forms.

"Enzyme active sites--where the reactions take place--can provide us a great deal of information and inspiration if we are able to fully understand what is happening," Okajima explains. "Our



(A) Extra-large crystal of a copper amine oxidase. (B) Three-dimensional structure of the copper amine oxidase including hydrogen atoms. An unusual "levitated" proton is presented in the center of enlarged view.



demonstration of using neutron crystallography to uncover proton quantum effects promises to be very useful for many researchers studying enzymes and their mechanisms."

*(The article, "Neutron crystallography of copper amine oxidase reveals keto/enolate interconversion of the quinone cofactor and unusual proton sharing" was published in PNAS at DOI: <https://doi.org/10.1073/pnas.1922538117>)*

### About Osaka University

Osaka University was founded in 1931 as one of the seven imperial universities of Japan and now has expanded to one of Japan's leading comprehensive universities. The University has now embarked on open research revolution from a position as Japan's most innovative university and among the most innovative institutions in the world according to Reuters 2015 Top 100 Innovative Universities and the Nature Index Innovation 2017. The university's ability to innovate from the stage of fundamental research through the creation of useful technology with economic impact stems from its broad disciplinary spectrum. Website: <https://resou.osaka-u.ac.jp/en/top>

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[https://www.eurekalert.org/pub\\_releases/2020-04/ou-ita042720.php](https://www.eurekalert.org/pub_releases/2020-04/ou-ita042720.php)

## COVID-19 Research

### THE TIMES OF INDIA

Tue, 28 April 2020

## Virus has mutated into 10 types, one now dominant across region: Study

Mumbai: The novel coronavirus, first reported in China in December 2019, has mutated into 10 different types and one of them — A2a — has nearly replaced all the others to become dominant across geographical regions, says a global study by an Indian institute.

The study, by Nidhan Biswas and Partha Majumder from the National Institute of Biomedical Genomics in Kalyani, West Bengal, will soon be published in the Indian Journal of Medical Research, a peer-reviewed medical journal published by the Indian Council for Medical Research (ICMR).

The novel coronavirus with the A2a mutation is highly efficient in entering human lung cells in larger numbers. The previous SARS-CoV that killed 800 and infected 8,000 people 10 years ago was also adept in entering the lungs, but not as much as A2a. It is efficient in transmission and resultantly, Covid-19 became highly prevalent across all regions, wrote the authors. The study is crucial as it provides vaccine manufacturers with a specific target.

The 10 types have evolved from the ancestral type 'O' over four months. A2a started overtaking other types across the world by March-end. "It has become the dominant type of SARS-CoV2," said Majumder.

The NIBG researchers used the RNA sequence data shared by Covid-19 researchers from across the world in a public database, GISAID. The team used RNA sequences of 3,600 coronaviruses collected from 55 countries from December 2019 to to April 6, 2020.

The first observation was that the coronavirus has evolved into newer types during its spread within China and the rest of the world. "The coronavirus can be classified into many types --- O, A2, A2a, A3, B, B1, and so on. Currently, there are 11 types, including type O which is the 'ancestral type' that originated in Wuhan," said Majumder, distinguished professor and founding director of the institute.

“To live, a virus must propagate by infecting other animals. A mutation usually disables the virus from transmitting itself,” said Majumder. However, some mutations enable the virus to transmit more efficiently and infect more persons. “Such mutant viruses increase the frequency (of transmission) and sometimes completely replace the original type of the virus. The SARSCoV2 is doing just that,” he added.

The coronavirus infection, or Covid, begins in the patient’s throat, then enters his lungs and multiplies, causing breathing difficulties. The scientists said the A2a mutation altered a component of the spike protein (the major protein on the surface) of the coronavirus, allowing it to bind more easily with the surface protein of the lung cell, said Majumder. Covid-19 has emerged as a pandemic because of the A2a type’s ability to transmit easily.

Even though the sample of RNA sequences used from infected persons in India was very small (35), the study showed that A2a accounted for 47.5% of the samples. Interestingly, more persons with type A2a have no known travel history to countries outside India. For any conclusions on whether type A2a is dominant in India, more samples of RNA sequences are required, said the researchers.

The study is important for the fight against Covid-19 --- to develop vaccines and also to determine the presence of co-existence of type A2a with other types in some regions. Studies are required to find out whether the co-existence is because of the ethnic composition of these regions or it’s because of their travel patterns. Researchers at the institute are trying to answer some of these questions.

<https://timesofindia.indiatimes.com/city/mumbai/virus-has-mutated-into-10-types-one-now-dominant-across-regions-study/articleshow/75417399.cms>

INDIA  
TODAY

Celebrating  
50 years

Tue, 28 April 2020

## New Covid-19 debate: How does coronavirus enter our body and can it transmit sexually?

*Novel coronavirus is spreading from human to human. Scientists are busy finding the entry gates in our body through which SARS-CoV-2 can enter the system.*

*Can it be transmitted sexually like HIV, Ebola or Zika?*

*By Prabhash Dutta*

### Highlights

- Fresh debate has begun on what are the entry points in our body for novel coronavirus
- A study in Europe found nose, eyes, mouth as vulnerable, pointed to potential faecal-oral transmission
- Study on Wuhan patients found no presence of coronavirus in human semen.

India Today's [coronavirus special website](#) has been consistently telling you in its reports that [understanding Sars-CoV-2](#) is still an undergoing process. What is clear on the basis of evidence is that the novel coronavirus cannot pierce through the normal healthy skin of humans.

During the recent major global viral outbreaks Ebola and Zika, scientists found that the disease causing viruses could transmit sexually. Research found that Ebola and Zika viruses could survive in a patient's semen for months after the person had been cured of the disease.

A [study on Covid-19 patients in Wuhan](#), the Chinese ground zero city for the novel coronavirus pandemic, has, however, found no trace of the pathogenic virus in human sperm. Though the sample size of the study was small, having looked at only 34 Covid-19 patients, the findings are comforting as the world struggles to keep a tab on the novel coronavirus spread.

Researchers found that the 34 men, in the age group of 31-49, showed no presence of novel coronavirus in their semen approximately one month after they were confirmed to be Covid-19 patients.

Apart from the small sample size, there is another limitation to the study. That is, this research was limited to examining the presence of Sars-CoV-2 in human semen, and did not consider possible transmission through saliva or sweat among partners.

Further, all these 34 Covid-19 patients had shown mild symptoms. "Unfortunately, we cannot definitively rule out the presence of Sars-CoV-2 in the seminal fluid during an acute infection with severe Covid-19 symptoms," the researchers said in their conclusion, indicating that there could a possibility that an infected man with a very high virus load may show presence of the novel coronavirus in his semen.

The researchers said, "ACE2-mediated viral entry of SARS-CoV-2 into target host cells is unlikely to occur within the human testicle based on ACE2 and TMPRSS2 expression. The long-term effects of SARS-CoV-2 on male reproductive function remain unknown."

Six patients (19 per cent) demonstrated scrotal discomfort concerning for viral orchitis (inflammation in testicles) around the time of Covid-19 confirmation.

ACE2 and TNPRSS2 are two proteins that the novel coronavirus uses to enter a person's body cells. External body organs with a high density of these proteins are particularly vulnerable to the novel coronavirus, and thus can become entry gates for Covid-19.

A [study](#) -- by Imperial College London, the Wellcome Sanger Institute, University Medical Centre Groningen, University Cote d'Azur, and CNRS, Nice -- published last week said nose and eyes are likely to be entry points for novel coronavirus.

The researchers said the novel coronavirus requires ACE2 and TMPRSS2 to enter human body cells. ACE2 is a receptor protein to which Sars-CoV-2 anchors itself. Thereafter, TMPRSS2 activates entry of the virus into a body cell.

The study found that two specific types of cells - -goblet and ciliated -- in the nose make the organ extremely susceptible to the novel coronavirus as they have a very high density of the facilitating proteins, which are otherwise essential molecules for human body functions.

ACE2 and TMPRSS2 are also found in good numbers in the cornea cells of human eyes. This makes eyes and tear ducts potential entry points for novel coronavirus.

The mouth is directly linked with the nose and lungs making it another gateway for the entry of the novel coronavirus. The enabling proteins are also found in the esophagus, ileum (small intestine) and colon.

All this points to, the researchers said, potential for faecal-oral transmission of the novel coronavirus. Earlier, a study had found that Sars-CoV-2 can stay active for 11 days in faecal remains.

Presence of enabling proteins in heart tissues could be a possible explanation why novel coronavirus is more lethal for people with pre-existing cardiac problems.

<https://www.indiatoday.in/coronavirus-outbreak/story/new-covid-19-debate-how-does-coronavirus-enter-our-body-and-can-it-transmit-sexually-1671632-2020-04-27>



# When will Covid-19 outbreak end in India?

## Researchers risk a May date

*Researchers in Singapore have prepared a mathematical model to predict when Covid-19 pandemic will end in different countries. The model predicts India will see 97 per cent decline by May 22.*

*By Prabhash Dutta*

### Highlights

- Researchers in Singapore have predicted end of Covid-19 outbreak in India by May 22
- End dates for India, 97 per cent by May 22, 99 per cent by June 1 and 100 per cent by July 26
- SIR model developed by researchers predict Covid-19 to continue in world till early December

Sitting in homes due to lockdown forced by novel coronavirus pandemic, millions of people in India and across the world have this question on top of their mind: when will Covid-19 end? Researchers in Singapore have risked answering this question.

On the basis of the pattern of spread of Covid-19 from China to the rest of the world and slowing down, the [researchers in Singapore](#) have a predicted date for 131 countries each when novel coronavirus outbreak will end there.

Covid-19 will end in India around May 21-22, the researchers said. This is the time when novel coronavirus infection will be 97 per cent down compared to April 20, which they found as the turning date.

This is close to what the Indian Council for Medical Research (ICMR) hinted last week. ICMR director Dr Balram Bhargava had **said**, "One can say we have been able to flatten the curve."

The ICMR said the positivity rate has been stable at around 4.5 per cent in India in recent weeks. This stable rate of spread of Covid-19 could be a signal of India having passed the turning date, estimated by the Singaporean researchers.

Their mathematical model predicts that by June 1, India will have cured 99 per cent of Covid-19 cases. And, the novel coronavirus will be eliminated by July 26 from India, the researchers estimated.

This will, however, sounds optimistic given the scale of the surge in big Indian states and cities - Mumbai and Pune in Maharashtra, Delhi, Jaipur in Rajasthan and Indore in Madhya Pradesh among others. On the other hand, four states though smaller in size of the population -- Goa, Tripura, Manipur and Arunachal Pradesh -- have become free of Covid-19.

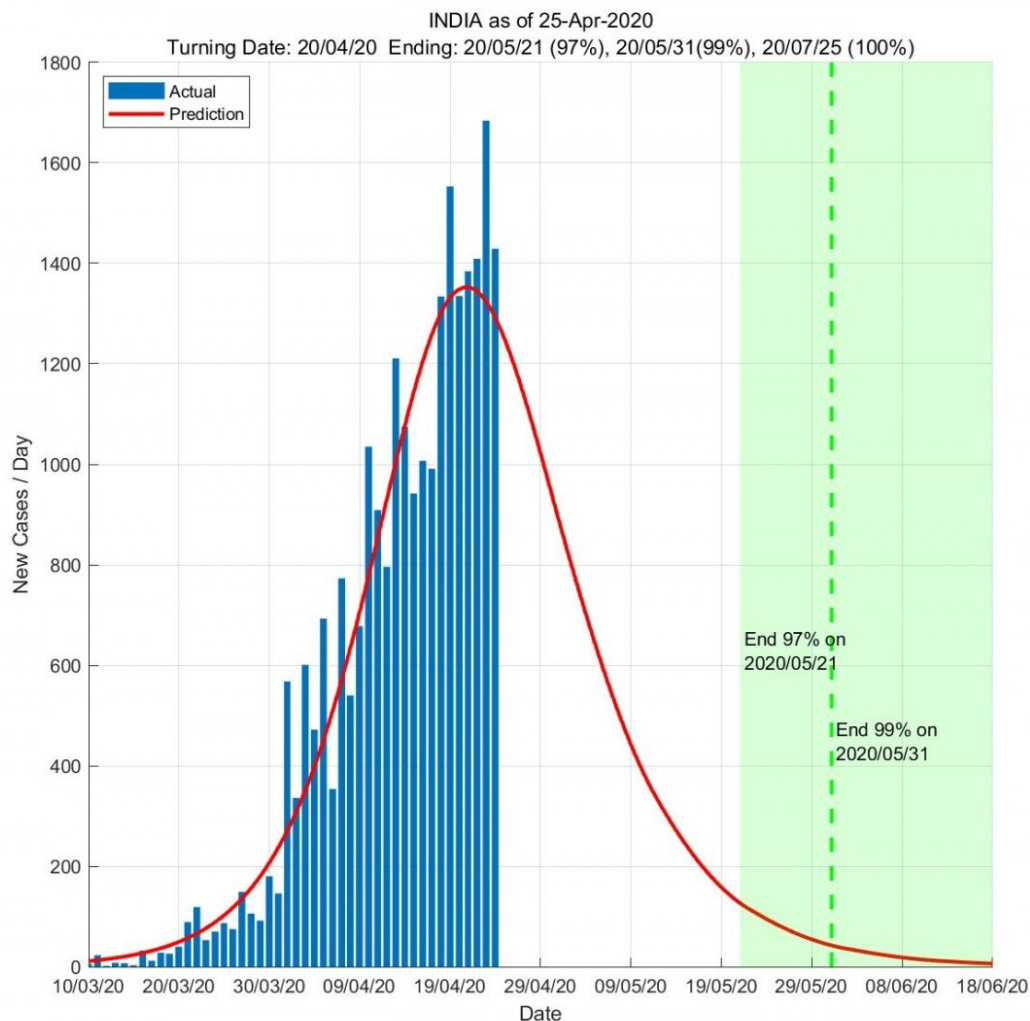
However, there is strong corroboration for the model, called the SIR (susceptible-infected-recovered) model. It estimated February 8 to be turning date for China, and February 27 as End-97 per cent date.

On the ground, China on February 19 reported the lowest number of fresh coronavirus infection in a month, indicated that the country was past the turning date.

The SIR model had March 4 as End-99 per cent date for China, which on March 7 reported 99 fresh Covid-19 cases, the first below 100 daily cases since the outbreak.

April 9 was End-100 per cent date for China. It has not happened in a strict sense of the term as China continues to report new cases. But, it was on April 8 that China allowed people to leave Wuhan, the Covid-19 ground zero, for the first time since it enforced lockdown in January.

Also, China has said that almost all the new Covid-19 cases in recent weeks are imported. On April 25, China said it recorded just one local novel coronavirus infection case in 10 days. Others were imported Covid-19 cases.



Covid-19 progress graph for India based on SIR model, developed by researchers in Singapore

The SIR model is very close to the ground situation in China. This research prediction brings some hope for Indians.

However, the researchers have themselves warned that "the model behind our prediction is only theoretically suitable for one-stage epidemic. The prediction is also conditioned by the quality of the data."

According to this mathematical model, Covid-19 will end in early December this year.

But this does not come without a note of caution. "The reality is the future is always uncertain. No one predicted the Covid-19 outbreak in October or November 2019, although Bill Gates famously warned about the potential damage of a global infectious disease to the world during a TED Talk in 2015," Jianxi Luo, the writer of the research paper said.

<https://www.indiatoday.in/coronavirus-outbreak/story/when-will-covid-19-outbreak-end-in-india-researchers-risk-a-may-date-1671533-2020-04-27>