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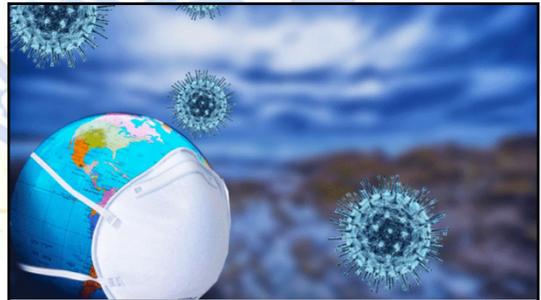
UFlex, IIT-Delhi jointly develop PPE coverall with anti-microbial coating

Flex Protect comes with four-layered Protection and Anti-microbial Coating

UFlex has recently developed a Personal Protective Equipment (PPE) Coverall 'Flex Protect' in joint collaboration with IIT-Delhi and INMAS, DRDO, Delhi. Flex Protect that comes with Four-layered Protection and Anti-microbial Coating has been approved by The Defence Research and Development Organisation (DRDO) for use by the front-line health workers who are fighting the battle against COVID-19.

The protective coverall is made from a combination of Non-Woven Polypropylene Fabric and further impregnated with Anti-Microbial PP Coating through a special process to increase the breathability. As compared to other PPE Kits, the Flex-Protect Coverall Standard is made of 70 GSM which makes it very comfortable and flexible, and fit to be worn for long hours as well.

In Flex Protect Coverall Standard, there are four-layers of security starting with First zipper, followed by Velcro, then Second zipper, and finally a Permanent Seal Tape. The edges of the PPE kit are secured with high strength seam cover that shields all the holes created during stitching. The coveralls are designed with double forearm, providing safety for the healthcare workers. The equipment comes with multi-layer fastening that seals all the inlet ways.



Listing the attributes and USP of the PPE Coverall, N Siva Shankaran, Vice President-Packaging Business at UFlex commented, "Most PPE Coverall available in the market are not breathable at all. The user sweats heavily due to perspiration and this causes a great deal of discomfort to them. Flex Protect has almost 30% better breathability while also conforming to ISO 16603 (Resistance to Blood and Body Fluids) which is mandatory against infection causing virus not to enter the coverall through the fabric."

Adding, "Breathability and ultimate protection by design are the USPs of Flex Protect. It is far superior to the fabric available in the market there by giving utmost comfort and ultimate protection to the para-medical staff who are currently in great danger of contamination and discomfort."

The PPE Coverall developed by UFlex and IIT-Delhi has been tested well for being anti-microbial. The South Indian Textiles Research Association (SITRA) has certified the fabric of PPE Coverall being compliant with Dry Microbial Penetration Resistance Test thereby implying fabric's protection against infectious agents. The anti-microbial coating will help in eliminating the microbes which comes in contact with the surface of the coverall, thereby creating the first line of defence".

On achieving this feat, Jeevaraj Pillai, Joint President, Packaging and New Product Development, UFlex said, “With rising cases of corona and scarcity of PPE Coverall, UFlex and IIT-Delhi recognized the opportunity towards playing a vital part in battle against COVID-19. We synergized our expertise in developing a Coverall that arrests the existing challenges in PPE Coverall and elevating the security of healthcare and other front-line workers who wear these Coverall for hours together. With the launch of our PPE Coverall that combines the advantages of longer wear and complete defense against coronavirus, we aim to make the world’s citizens safe, by arming the front-line workers with Flex Protect coveralls. The approval from DRDO is hugely encouraging for us, adding impetus to our efforts.”

On successful development of this revolutionary kit, Prof. Harpal Singh, Head, Centre for Biomedical Engineering at IIT- Delhi said, “Centre for Bio Medical Engineering, IIT, Delhi has worked very closely with UFlex, Noida on the development of Breathable Fabric to be used in Flex Protect Coverall. The response and reaction time in the development was fast and excellent and it is the endeavour of IIT to collaborate with industrial partners for research and development to strengthen the domestic industry capability for providing devices and products in times of national emergencies. IIT Delhi is happy to have UFlex as our industrial partner in this challenging project.”

<https://www.manufacturingtodayindia.com/products-suppliers/7461-uflex-iit-delhi-jointly-develop-ppe-coverall-with-anti-microbial-coating>

Business Standard

Fri, 29 May 2020

Uflex develops protective coverall 'Flex Protect' jointly with IIT-Delhi and INMAS, DRDO, Delhi

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(This story has not been edited by Business Standard staff and is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/news-cm/uflex-develops-protective-coverall-flex-protect-jointly-with-iit-delhi-and-inmas-drdo-delhi-120052800285_1.html

CCMB cultures coronavirus with Potential for vaccine, drug development

Hyderabad: CSIR-Centre for Cellular and Molecular Biology (CCMB) on Thursday announced that it has established a stable culture of coronavirus, which will enable the premier research centre to work towards vaccine development and testing potential drugs to fight Covid-19.

Over the last month and a half, the CCMB established stable cultures of Covid-19 causing coronavirus, SARS-CoV-2, from patients' samples.

A team of researchers led by CCMB virologist, Dr. Krishnan H. Harshan have isolated infectious viruses from several isolates. The ability to culture the virus in the lab enables the CCMB to work towards vaccine development and testing potential drugs to fight Covid-19. It also makes them a potential donor of the culture to other authorised centres that can continue growing the virus for their own use.

Explaining how SARS-CoV-2 affects humans, he said that it infects epithelial cells in human respiratory tract. "The viruses infect these cells by interacting with receptor proteins called the ACE-2 following which the virus is internalised by a process namely endocytosis. Virus RNA is later released into the cytoplasm of the cells where it makes viral proteins first and then starts to replicate the genomic RNA. Thus, the virus uses resources from these cells to make more copies of itself. Therefore the virus needs a set of host factors that allow it to replicate."

"Primary epithelial cells generated from human origins do not grow for many generations in labs, which is key to culturing viruses continuously. And hence, CCMB and other labs who are growing the virus need an "immortal" cell line," says Dr Harshan.

They use Vero cells - kidney epithelial cell lines from green African monkey, which express ACE-2 proteins and carry a mutation that allows them to proliferate indefinitely.

"Using the Vero cell lines to grow the coronavirus, the CCMB is now in a position to isolate and maintain viral strains from different regions. We are working towards producing viruses in huge quantities that can be inactivated, and used in vaccine development and antibody production for therapeutic purposes," said CCMB Director, Dr Rakesh Mishra.

He said the CCMB also started testing potential drugs with other partners such as Defence Research and Development Organisation (DRDO) using this viral culture. "We hope that such systems are replicated at multiple research institutes and private companies to become a useful resource in the fight against this pandemic as well as for future preparedness," he said.

Researchers pointed out that historically, attenuated or killed viruses are used as vaccines in several cases, such as in the case of polio. Though the inactivated virus can not initiate infection, their structural proteins trigger antibody production in the cells. The efficacy of inactivated SARS-CoV-2 as vaccine candidate is currently being investigated by several groups.

Inactivated viruses can also trigger antibody response in other mammalian hosts in addition to humans. Various such hosts are currently under test for their efficiency of antibody response. They can vary from small rodents such as mice to large mammals such as horses and camels. Such antibodies generated in these non-human hosts can be purified and processed for injecting into humans.

The researchers believe virus culture will also help in testing of various disinfectants. Currently there is a huge need for surface disinfectants that can kill SARS-CoV-2 on various surfaces including PPE kits and clothes. Virus culture is a key component in studies that can test the efficacy of several proposed disinfectants. The ability of the key ingredients of the disinfectant will be tested for their ability to kill the virus.

SARS-CoV-2 culture will also be helpful in testing of instruments. Ultraviolet rays (UV) are well-known agents that can effectively kill virus particles and prevent infection. There is a huge demand both for domestic and industrial activities to eliminate SARS-CoV-2 from various materials including packaging materials. Such instruments need to be tested for their efficiency in killing SARS-CoV-2 after exposing virus cultures to the UV rays.

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

<https://www.outlookindia.com/newscroll/ccmb-cultures-coronavirus-with-potential-for-vaccine-drug-development/1849155>



Fri, 29 May 2020

CCMB successfully cultures virus, begins testing of potential drugs

Virologists at CCMB headed by Dr Krishnan H Harshan have isolated the infectious viruses

Hyderabad: The Centre for Cellular and Molecular Biology (CCMB) has successfully cultured the novel Coronavirus from the samples collected from the Covid-19 patients and is in a position now to produce inactivated forms of the virus in large quantities, to help the pharmaceutical companies test their drugs and vaccines.

Virologists at CCMB headed by Dr Krishnan H Harshan have isolated the infectious viruses. Speaking to Express, CCMB Director Dr Rakesh Mishra said the research lab had successfully cultured the novel Coronavirus in Vero cells and Vero E6 cells, which yields higher amounts of the virus and the human lung epithelial cells as well.

This has enabled the CCMB to assay the cells. He said many government and private organisations had already approached the CCMB to test their drugs, instruments and other anti-novel Coronavirus products.

He said, "Using the Vero cell lines to grow the Coronavirus, CCMB is now in a position to isolate and maintain viral strains from different regions. We are working towards producing viruses in large quantities that can be inactivated, and used in vaccine development and antibody production for therapeutic purposes." Dr Mishra added, "We have started testing potential drugs with other partners such as DRDO using this viral culture."

We hope that such systems are replicated at multiple research institutes and private companies to make a useful resource." According to a release by the CCMB, there are six potential uses of the virus culture successfully conducted by the CCMB - vaccine development, developing antibodies or antidotes, testing of antibodies, drug-screening, testing of various disinfectants and testing of instruments that are meant to kill the novel Coronavirus.

Situation in TS under control: Chief Secy

Hyderabad: Chief Secretary Somesh Kumar informed Union Cabinet Secretary Rajiv Gauba that the Covid-19 situation in Telangana was under control. Rajiv Gauba, on Thursday, held a video conference at Delhi with all the Chief Secretaries and Health Secretaries on measures against Covid. Somesh Kumar told the official that the State government had been following the guidelines issued by the Centre and making all the arrangements to control virus, particularly in the containment zones. The Chief Secretary added that the government was well-prepared with requisite PPE kits, masks, testing kits, beds, ventilators and hospitals to manage up to one lakh cases in the State.

<https://www.newindianexpress.com/cities/hyderabad/2020/may/29/ccmb-successfully-cultures-virus-begins-testing-of-potential-drugs-2149324.html>

How the ₹10,000-crore PPE industry popped up in two months

By M Ramesh

Thanks to the Covid-19 pandemic, a new market, estimated to be worth at least ₹10,000 crore, has popped up from nowhere.

Starting from practically nothing only two months ago, India has now become the world's second-largest supplier of medical personal protective equipment (PPE). These are products like goggles, face-shields, masks, gloves, coveralls and gowns, head and shoe covers.



In 60-odd days, the industry has grown 56 times, according to a recent report by Invest India, a company set up by the government to facilitate investments. Over 600 companies in India are certified to produce PPE. These include textile biggies such as Arvind, JCT Mills, The Trident Group, Welspun and Shahi Exports. India today manufactures 4.5 lakh pieces of PPE a day, and now the country is well-positioned to seize a share of the global market, which will be \$60 billion by 2025.

Prompt action

How did the industry gather itself so quickly? Many give credit to the swiftness with which the government acted.

Harish Ahuja, Chairman and Managing Director of Shahi Exports, recalls getting a call from the Textiles Secretary in early April. Noting that Shahi Exports' 58 plants in the country have been lying shut due to the Covid-19 pandemic, the Secretary asked Ahuja if he could take up the manufacture of coveralls — protective gowns, made of special, non-woven fabric.

Shahi Exports swung into action. Though only five of its 58 plants needed to be pressed into service and only 750 of its 1.2 lakh employees were used for the purpose, the company now makes 20,000 coveralls a day. It has so far supplied close to nine lakh pieces to HLL Lifecare of Kerala, the Central government's agency for medical procurement.

The story is the same across the industry. A nudge from the government, an appeal for helping the country in the time of crisis and a new business opportunity when none else existed, seem to have done the trick. "The textile industry working closely with the Government of India created an entire industry from scratch," Kulin Lalbhai, Executive Director, Arvind Ltd, told *BusinessLine*. Arvind makes 15,000 coveralls a day from its plants in Bengaluru, Ahmedabad and Ranchi.

Making the shift

As is always the case, there were challenges. Since before Covid-19 came, the PPE industry in India was very small and all the raw material used to be imported from China. But when the pandemic broke out and imports were not possible, the industry had to quickly develop a domestic supply chain. "We have been able to work with our suppliers to shift a large part of the supply chain to India," Lalbhai said.

Ahuja notes that today all the raw materials, with the sole exception of sealing tapes, are available in India, which puts the country at an advantage over the principle competitors, Vietnam and Cambodia.

Of course, it helped that the industry already had the equipment. "Fortunately, we had all the machines needed to produce the coveralls," Ahuja told *BusinessLine*. Shahi Exports, which is among the top textiles and garments exporters in the country, was also making rain-proof clothing. Likewise, Arvind was also into technical textiles — for which there was a big push in the recent

Budget. The company used to make protective clothing for oil and gas, medical and automotive industries. Thus, to ramp up medical PPE was but one step.

Growing market

The Defence Research and Development Organization lists over 275 companies certified to make medical coveralls (the DRDO has been in the forefront for developing counter-Covid-19 products and been licensing them for free to the industry). Ninety-five manufacturers are supplying coveralls to HLL Lifecare. Most of them are not as big as Arvind or Shahi. Many such as Grassroot Markmen of Delhi started fresh into this business. Grassroot, which has just begun production, says it will soon manufacture 3,000 coveralls a day.

Today, India has an inventory of 15.96 lakh PPE kits (of all kinds) and another 2.22 crore kits are being manufactured against firm orders by the industry, according to the Invest India report. Bengaluru has become a major PPE hub, where half the production happens. The rest of it is spread across the country — Tiruppur, Coimbatore, Chennai, Ahmedabad, Vadodara, Ludhiana, Bhiwandi, Kolkata, Noida and Gurugram.

What happens after the market is saturated? All the manufacturers that *Business Line* spoke to are confident of exporting. “Once we have enough for ourselves,” says Lalbhai, “there will be ample opportunities to export.” Likewise, Ashok Naik of Grassroot Markmen sees “huge potential in exports.”

The \$60-billion market, in which there are just a handful of players, is a veritable blue ocean.

<https://www.thehindubusinessline.com/economy/how-the-10000-crore-ppe-industry-popped-up-in-two-months/article31692099.ece#>

DRDO Technology News

BW BUSINESSWORLD

Fri, 29 May 2020

DRDO must find a way of building a suitable fighter engine in partnership for future aircraft: Indian Air Force Chief RKS Bhadauria

By Manish Mumar Jha

Again, amid the clashes and burning threat at LAC in Ladhak, IAF’s front line fighter jet Su 30 MKI scrambled & reverberated as it did during the Balakot air strike. But it is time to address capability gap too. While the first LCA Tejas Mk-1 in Final Operational Clearance standard got inducted into No. 18 ‘Flying Bullets’, 83 MK-1A version will be a force majeure. But greater challenges remain for 450 jets, Gen 5+ AMCA & capability for jet engine at the heart of indigenization. In an exclusive interaction, Chief of Indian Air Force, Air Chief Marshal R.K.S. Bhadauria, speaks with BW Businessworld’s Manish Kumar Jha on the critical steps and the thrust on R&D in aerospace.



Chief of Air Staff, IAF

Is there any plan for budget cut for the IAF due to economic fallout? What platforms are being prioritized to be inducted or ordered? How will IAF base its demand between security and budget?

Pending the receipt of revised budget estimates, we are targeting a 20-25% savings in the revenue expenditure, as a first step. On capital expenditure, our highest priority lies with the contract for 83 LCA MK1A. Additionally, we are in the process of prioritizing our critical requirements, weapons and technologies like the air to air missiles, air to ground precision weapons, networking, data linking etc. We are working towards industry critical capabilities and minimizing the impact of budget constraints on modernisation.

Our quest for Atma Nirbhar Bharat in defence will not materialize if we just put ~ 6% of the defence budget to our sole DRDO while China puts about 15 to 20 % into their R&D. As a chief of IAF, how do you look at such fundamental flaws? What do you suggest as time has come to address such gaps?

Funding for DRDO R&D has been increasing yearly and is based on projections by DRDO itself. The DRDO plans its future R&D based on a Technology Development Roadmap worked out in consultation with the services and its own assessments. I have no doubt that there is a strong case to enhance indigenous R&D by DRDO in niche technologies. DPSUs and the private sector need to increase their emphasis on R&D. R&D is fundamental to successful indigenization, suitable product development and import substitution. First step should be to focus the available budget on high prioritization of niche technological areas.

The MMRCA 2.0 is all about building the complex aerospace ecosystem, leveraging on the full scale ToTs with leading FOEMs and that build up ADA (DRDO) and future AMCA as well. Why do we intend to delay the project of national importance- for security & defense economy?

All major platform procurements where the numbers required are high will be Make in India be it Tejas Mk IA, Tejas Mk II, MRFA or AMCA. The MRFA programme will be fully Make in India and will significantly benefit future Indian projects by infusing cutting edge technologies into the domestic industry. After receiving initial responses to the RFI and having detailed discussions with all vendors the SOC is under finalization. In order to suitably energise and support the development of a complex aerospace ecosystem, I strongly feel all the projects have a big role to play. Therefore our major focus on 83 LCA followed by LCA Mk II & AMCA is parallel to MMRCA 2.0 as you put it.

You recently outlined the 450 fighter jets in a decade. India has own fighter jets-LCATEjasMK1a while 4+ Gen concept-Tejas Mk 2 and 5+ Gen- AMCA are on drawing board. And, keeping HAL's sporadically delivery, first squadron of MK IA is expected in 2025. How will we achieve the strength of 42 squadron?

Involvement of the DPSUs, private sector and MSMEs effectively by putting in place modern production facilities would be essential to ramp up delivery of fighter aircraft and other platforms and systems. The key to increase in numbers lies in successful and rapid establishment of a comprehensive aviation ecosystem.

Estimated a more than thousand engine for the fighter jets for ambitious projects-Tejas variants & futuristic AMCA -- IAF has spoken of indigenously built engine which has not taken off. Why don't we leverage our partnership with friendly countries & make it happen in India?

Design and manufacture of a modern fighter jet engine is a highly complex, expensive and niche capability. Kaveri project has not succeeded in delivering an engine for fighter aircraft and IAF is not insisting on this indigenous engine. DRDO must find a way of building a suitable fighter engine in partnership and this is the initial path to success of future aircraft programmes.

Directed Energy/Lasers are the weapon of future for fighter aircraft –manned and unmanned. How are we leading in R&D in this area?

Directed Energy or Lasers are important technologies for IAF's future platforms and weapon systems. We are looking at this capability and are supporting measures to develop such key enabling technologies.

The critical role of IAF is always up and visible in immediate response against the concurring attacks. But equally is the concern for China building stealth jets like J20 & J31 with large numbers and developing jet engines and helping Pakistan build up air strength. Will the gap be much wider with China in terms of Aerospace superiority in times ahead?

Technological asymmetry does not remain constant and varies in different spheres with the advantage shifting depending on development and procurements. Increasing Chinese technological capability is an outcome of their sustained efforts in R&D. The IAF is working closely with DRDO and others to close the gap on these technological asymmetries. A progressive increase and improvement in our combat aircraft force enablers, sensors, weapons and network centric operations capability should help us address our assessed threats in the future. Indigenization of R&D and production is the key for our future capacity building.

<http://www.businessworld.in/article/DRDO-Must-Find-A-Way-Of-Building-A-Suitable-Fighter-Engine-In-Partnership-For-Future-Aircraft-Indian-Air-Force-Chief-RKS-Bhadauria/29-05-2020-193517/>



Fri, 29 May 2020

IAF commits for 100 MWF-Mk2, No Trainer planned

Air Chief Marshal RK Bhadauria in talks with Indian media has confirmed that Indian Air Force (IAF) plans to procure at least 6 Squadrons of upcoming Medium Weight Fighter (MWF), Project name which still goes by as Tejas Mk2 and has committed to procure 100 jets, which will comprise of 16 jets per squadron. Since no trainer variant (conversion two-seaters) have been planned for each squadron at least 4 jets will be used to train new pilots and will move among this squadrons to be used as Single seater Trainer for pilots moving from Tejas Mk1/A and other squadrons.

HAL and ADA will start work on first pre-production IOC certified MWF aircraft from 2021 onwards by starting metal cutting work and final configuration freeze will happen by end of this year so that operation is smooth and on the scheduled time.

MWF will have its first flight by 2023 and will be followed by 3 more jets which will see a move from IOC configuration to FOC configuration with each aircraft configurations. ADA is skipping TD (Technological Demonstrator) and PV (Prototype Vehicle) Stage for the MWF Program which will allow ADA and HAL to directly move to the production stage from its first flight in less than 5 years.



ADA expects, DRDO developed Uttam AESA Fire Control Radar (FCR) to be certified by 2022 which will be incorporated in the first MWF from the first aircraft itself. LRDE which has developed the UTTAM AESA FCR plans to scale up limited serial production of the radar in the coming years so that radar is available for all the four pre-production MWF aircraft for intense testing and validation of the technologies. UTTAM AESA FCR which has been integrated on older

LSP Tejas Mk1 as demonstrated better scan and track range in comparison to the Israeli ELM-2052 AESA FCR which has been selected for the Tejas Mk1A program, but is yet to demonstrate all modes due to which it has been overlooked for Tejas Mk1A program.

MWF will start replacing the Mig-29UPG fleet which in 2035 could be close to 50 years in service and later also Mirage-2000 and Jaguar fleet. IAF doesn't want to replace MWF in one to one replacement for this 3 fleet type but it will use MMRCA and Tejas Mk1A to make these numbers.

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<https://idrw.org/iaf-commits-for-100-mwf-mk2-no-trainer-planned/#more-228236>

Defence News

Defence Strategic: National/International

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Fri, 29 May 2020

Air Defence Command: Need to hasten slowly; serving Chiefs best to take calls

The set-up of an integrated Air Defence Command poses many questions, considering existing and prospective resources, current structure, challenges and lessons learnt by other countries

By Anil Chopra

In an interview to defence analyst Nitin Gokhale, Chief of Defence Staff (CDS) of Indian Armed Forces, General Bipin Rawat, has explained in detail how he, along with the three service Chiefs, is evolving the Tri-Services Air Defence Command, a Maritime Command, and creating joint Logistics nodes. He also mentioned that Joint operational commands are also being envisaged and under study. It is clear from this interview that, despite Covid, the General is moving ahead with a sense of purpose and in fact seems to have hit the ground running. It is no more letting 'the cat among the pigeons' but being seriously driven forward. India is looking at overseas bases for logistics. A little earlier there was a proposal to set up a separate theatre command for Jammu and Kashmir. Executive orders for setting up the Air Defence Command (ADC) are expected by end of the year and in the next two years, the formation work will be put in place, and the ADC should be fully operational in 3-5 years. The Indian Air Force (IAF) will helm the ADC and all-long-range missiles as well as Air Defence (AD) assets will come under it. India could also have tri-services training and doctrinal command. While the Veterans with years of experience and time can research on these subjects and put their opinions in public domain, the serving Chiefs and their staff have the best current inputs to take final calls.



Functional and Geographical Commands

Currently the United States has seven unified geographical combatant commands covering the entire planet and globe, including the Space Command. All these commands cover areas mostly outside the USA. The USA has four functional combatant commands, Cyber, Special Operations, Strategic, and Transportation. The commands are composed of units from different services and are established to provide effective command and control in peace and war. The US Army has many commands of their own. The US Navy has nine independent commands and seven active fleets. The US Air Force (USAF) has nine Commands, mostly functional in nature. USAF comprises nearly 5,000 manned and many unmanned aircraft. Aerospace Defense Command (earlier established as Air Defense Command in 1946) was created for continental air defence of the United States in 1968. The Command was deactivated in 1980, primarily due to a large number of aircraft having multiple roles, and limited specialised assets. Air Combat Command under USAF is the primary force provider of air combat forces to America's war-fighting unified commands. As China grew its military assets significantly in the last few years, its People's Liberation Army (PLA) was divided into five Theatre Commands in February 2016, covering only the Chinese mainland. PLA Air Force (PLAAF) has 29 operational air divisions, with three regiments per Division and 3 Squadrons per regiment. Each Division has 7 to 9 Squadrons. Effectively PLAAF has nearly 200 squadrons. Despite such a large air force, China does not have an Air Defence Command. The Russian Air Force structure was completely changed in 2009 to a command-air base structure from the previous structure of army-air division system, to make them independent from the army-support thinking. Russian Air Force and the Russian Aerospace Defence Forces were merged in August 2015. The Russian air force now has the Air Defence and Anti-Ballistic Missile Defence Forces Command, Space forces command, the Military Transport Aviation Command, and the Long-Range Aviation Command.



CDS and Service Chiefs. Picture Credit: Business standard

Air Defence Assets Indian Army

The Corps of Army Air Defence (AAD), of the Indian army is tasked with air defence of Indian Army's integral assets and certain designated VA/VPs, at heights below 5,000 feet. The corps was formed with autonomous status in 1994, after the bifurcation of the Corps of Air Defence Artillery from the Army's Artillery Regiment. It has around 85,000 soldiers and 6,000 officers, and its own Army Air Defence College. The main AD assets of Indian Army include the Akash surface to Air Missiles (SAM), 9K33 Osa (SA-8), 9K35 Strela-10 (SA-13), 9K22 Tunguska, 9K38 Igla, ZSU-23-4M 'Shilka', FIM-92 Stinger, among others. Indian Army also has many radars linked to its AD systems, which are further integrated by the project 'Akash Teer' for situational awareness.



9K33 Osa. Picture Credit: Wikimedia Commons

Air Defence Assets Indian Navy

The Indian Navy (IN) has significant air elements including nearly 200 aircraft, some of which, like the MiG 29K can take on the AD task. IN has one operational aircraft carrier. The second aircraft carrier, indigenous Vikrant is in advance stage of readiness and may be inducted in next

two years. The naval variant of LCA Mk1 has already done deck landing and take-off trials. Most of its 235 ships have powerful radars and have SAMs and guns for AD tasks. The ships have significant Electromagnetic Counter Measures (ECM) and Electromagnetic Counter Counter Measures (ECCM) to defend from airborne threat. IN's indigenous Trigun System helps enhance battle-space transparency with better network-centric warfare tools riding on high-speed data communication systems and their integration. It integrates data from civil and military vessels, submarines and aircraft and shares with all its platforms. Currently air defence of some naval installations and assets at sea is the responsibility of the IN.



Picture Credit: DNA

Air Defence Assets Indian Air Force

As per the Union War book, IAF is directly responsible for the air defence of India. To achieve this, IAF has air-superiority aircraft like the Su-30 MKI, and soon to be inducted Rafale; dedicated air defence interceptor aircraft like MiG 21 Bison, MiG 29, and LCA; there are other aircraft which

are multi-role but have significant AD capability like Mirage 2000. All AD aircraft have their electronic warfare suites. Most AD aircraft also have ground attack or other roles. IAF has a variety of SAMs like the Pechora S-125, Osa-AK, indigenous Akash, SPYDER LLQRM system, and the shoulder red Igla-M missiles. They provide air defence against aircraft, helicopters, cruise missiles and UAVs. DRDO has entered into a joint venture with Israeli Aerospace Industries (IAI) to develop the Barak-8 SAM. IAF has two Embraer ERJ-145 based indigenous DRDO AEW&C 'Netra' aircraft. It also has 3 EL/W-2090 Phalcon AEW&C incorporated in a Beriev A-50 platform. Two more are in order. India is also going ahead with 'Project India', an in-house AWACS program to develop and deliver 6 Phalcon class AWACS, based on DRDO work on the smaller AEW&CS. IAF currently has two Aerostats giving nearly 400km range coverage. The Air Force Network (AFNET) is a robust secure digital information grid that is helping the IAF become a truly network-centric air force. Integrated Air Command and Control System (IACCS), an automated system for Air Defence operations, links command and control centres with offensive aircraft, sensor platforms and ground missile batteries. It rides on the AFNET. Integration with civil radars and other networks provide an integrated 'Air Situation Picture', for intelligence analysis, and mission control.



IAF EL W-2090 Phalcon AWACS. Picture Credit: forceindia.net

Indian Ballistic Missile Defence & ASAT Programs

India faces ballistic missile threats from Pakistan and China. India's Ballistic Missile Defence (BMD) Program is a multi-layered system to protect India from ballistic missile attacks. Currently it consists of land and sea-based interceptor missiles, the Prithvi Air Defence (PAD) missile for high altitude interception, and the Advanced Air Defence (AAD) Missile for lower altitude interception. It can cover incoming missiles launched from 5,000 km away. The system includes an overlapping network of early warning and tracking radars, as well as command and control posts. The PAD was tested in November 2006, followed by the AAD in December



Indian Ballistic Missile Defence. Picture Credit: The Diplomat

2007. India became the fifth country to have successfully developed an anti-ballistic missile system, after the USA, Russia, Israel and China. The system has undergone several tests, but the system is yet to be officially commissioned. The first phase of the BMD program is now complete and DRDO and IAF are waiting for the government's go-ahead to install the missile shield for the national capital region. Also, the Anti-Satellite (ASAT) missile test (Mission Shakti) was successfully conducted in 2019.

S 400 and NASAMS

India and Russia signed a \$5.43 billion deal for the supply of five S-400 regiments on 5 October 2018, ignoring America's Countering America's Adversaries Through Sanctions (CAATSA) Act. The S400 was expected to be inducted into IAF service in October 2020. There are reports of some delays. The S-400 anti-aircraft weapon system has an operational range of 385km. According to Siemon Wezeman, senior researcher at Stockholm International Peace Research Institute (SIPRI) the S-400 "is among the most advanced air defence systems available". USA has recently approved the sale of an Integrated Air Defence Weapon System (IADWS) to India for an estimated cost of \$1.9 billion.



S 400 air defence system. Picture Credit: Sputnik News

National Advanced Surface to Air Missile System (NASAMS) is a distributed and networked medium to long range air-defence system with the first surface-based application for the AIM-120 AMRAAM (Advanced Medium Range Air-to-Air Missile). The missile itself is named SLAMRAAM (Surface Launched AMRAAM). On offer is the NASAMS 2, which is an upgraded version of the NASAMS air-defence system, and it has been operational since 2007. The proposed sale comes amidst the massive military modernisation and muscle flexing by China. It will also further enhance greater interoperability between India and the USA. India has reportedly requested for five AN/MPQ-64F1 Sentinel radar systems; 118 AMRAAM AIM-120C-7/C-8 missiles; three AMRAAM Guidance Sections; four AMRAAM Control Sections; and 134 Stinger FIM92L missiles.

Air Space Management in India

Air Space Control (ASC) refers to regulating the use of the 'finite' air space by various users. From a military operations point of view, the objective of airspace control is to maximize the effectiveness of combat operations without adding undue restrictions and with minimal adverse impact on the capabilities of any component. Stress is on close coordination that must exist between airspace control, air traffic control, and area air defence units to reduce the risk of fratricide and balance those risks with the requirements for an effective air defence. ASC species air space control procedures, joint services procedures for integrating weapons and other air defence actions within the operations area. ASC measures provide maximum flexibility and responsiveness to all airspace users. Geographic arrangement of air defence weapons within the battlespace and procedures for identification and engagement is part of ASC. During



Akash AD System. Picture Credit: India Today

conflict, the air activity in the Tactical Battle Area (TBA) is extremely dense. Both friendly and enemy aircraft are transiting. Most flights are launched at a very short notice based on evolving tactical situations. There are many UAVs. Also occupying the airspace are high velocity long and

medium range artillery shells and a variety of missiles. Ground based air defence weapons are on hot standby, and some operated from remote locations close to the forward edge of the battle area (FEBA). The civil air operations have to be allowed to continue albeit with small restrictions and regulations in time and space. There is therefore a need for faster timely information sharing.

There have to be clearly designated agencies for direct and procedural control. Airspace management in most countries is with the air force, and so it has been with Indian Air Force (IAF) in India.

Existing Functional and Geographical Commands

Indian Army has six geographical and one functional command. Similarly, IAF has five geographical and two functional commands. Indian Navy has two geographical and one functional command. India already has an example of integrated tri-service geographical Command (ANC). The tri-service Strategic Forces Command (SFC) exercises control over India's nuclear triad. The main aim of this model was efficient equipment management, maintenance and training. While SFC has a totally stand-alone charter, the success of ANC is still being questioned.



Andaman & Nicobar Command, Picture Credit: Wikipedia

Proposed Air Defence Command

Till now each service has its individual air defence set-up and maintains their own AD resources to counter specific threats perceived by each, sometimes even having overlapping areas. The proposed air defence command is meant to integrate the air defence assets of the Army, Air Force and Navy and jointly provide air defence cover to the country. It will be headed by an IAF officer. The overall responsibility of thwarting an enemy air invasion shall continue with the IAF, while bringing the ground-based AD resources under better synergy. Integrating AD assets are meant to also assist in better airspace management giving maximum freedom to various ground and aerial weapons yet avoiding 'fratricide' during war like conditions. The AD Command will be a functional command.

The case is that, in the era of hybrid war, integration of all kinetic and non-kinetic tools is considered as an operational necessity. The entire military power needs to work in a coordinated manner. The armed forces need to relook the structure for better synergy and integration. Triservices AD Command is the first off the block. The key



MiG-29 Upgrade. Picture Credit: newsmobile.in

elements of AD are the ability to detect and identify the threat and thereafter to engage and destroy. The threat could be any adversary military flying system from a manned/unmanned aircraft to incoming missile. All the three services have weapon systems to tackle these threats. IAF's combat aircraft equipped with air-to-air missiles can engage the threat at the farthest distances. Once within the surface-to-air guided weapons (SAGW) range, the fighters may disengage, and missiles take-on. The close-in weapon systems could be short range AD missiles and anti-aircraft artillery guns. The assignment is done by the sector AD Commander. Peculiarities of operations of each service create distinct air defence needs. Currently all procure their own AD assets, some of which may have commonality, or even have interoperability issues with each other. Therefore, an integrated approach could be operationally relevant. Integration of equipment, systems, training, maintenance, and reducing duplication could save resources and enhance operational efficacy.

Challenges and Opportunities

There are many challenges for the AD Command that need to be understood and factored. The concept of AD Command has been tried for many years by USAF, which has huge resources, yet rejected. Both Russia and China with the next largest air assets have not created an AD Command because of the multirole aircraft and inefficient use of resources. In the Indian context, the AD Command will cover the entire air space over the Indian landmass and territorial waters. All airspace users, military and civil, will need to coordinate their activities with the AD Command, a responsibility currently with the IAF, which also has most AD assets. The Air Force commander of AD Command will be reporting to CDS. The air assets, most of which are multirole, will still be with the IAF. Imagine distributing small fleets of multirole aircraft (36 Rafael). Mirage 2000 has AD, Strike and EW roles. Upgraded MiG 29 has significant ground attack capability. SU-30 MKI will be used for Offensive sweep missions, yet available for AD role. It will lead to their suboptimal utilization. Integrating all the radars, ground based weapons systems, including the secure independent networks of each service would be the next challenge. Systems like the radars and IAACS are required not only for AD but also for offensive sweeps and strike missions. India still has just a few AWACS; they are required for both offensive and defensive missions. Similarly, the very few FRA will be required for all types of mission. Will the AD assets of the highly mobile Strike Corps and AD of the Army formations in the mountainous border be part of the integrated AD Command? How will AD Command integrate with the mobile elements? Could this be counterproductive? The AD of the naval fleet at sea is very peculiar. There are layers of AD cover provided by various ships. Carrier based air operations also have their own peculiarities. Will the AD of naval assets at sea be with AD Command or with IN? Will the operational efficiency be enhanced after creating the AD command? In case that is compromised, the entire exercise will be futile. Just integrating all the ground-based radars and leaving them with IAF could be a first logical step. Up to the Air Defence Identification Zone (ADIZ) the AD responsibility is with the IAF. Out in the sea, Navy looks after its AD. Very small hand-held UAVs of the Indian Army flying below a certain height already have freedom to operate. So is the case of inter ship movement of helicopters and low flying helicopters of Indian Army in TBA.

There is another proposal to later create geographical combined commands. China's 'Western Theatre Command' with which India shares its entire border covers a geographical area larger than India. To create a smaller theatre against such a massive integrated Chinese theatre would be a losing proposition. IAF is already down to 29 combat squadrons. The number could go down to as low as 25. India is looking at a two-front war. Giving fixed air assets to any geographical command would null the great flexibility air power provides. If India was to remain a single theatre as is the case currently, then all air assets could remain as it is with the IAF. If multiple theatre commands were to come up, then the scarce assets would have to be allotted to different commands. Adequacy of resources is a very serious issue. Situation is unlikely to change in the next decade or so. There is a famous saying "if it isn't broke, don't x it".

Way Ahead

The CDS obviously has the charter and desire to quickly achieve integration of the armed forces. He is driven by his personal experiences of years of distinguished service and training in the Army. Any proposed change would have long term operational and financial affect. We need to hurry slowly and firm-footedly. AD Command appears to be being built as a test case. Lot of deliberations are required by think-tanks and service HQs. In India where we take tens of years to appoint a CDS and no less to acquire weapon platforms, such reformation changes must be incrementally evolved over next 4-5 years and not have deadlines of six months. India still has limited resources unlike the USA and China. Even then they treaded slowly and did not have an AD Command. Let us first concentrate and build on the tri-service Defence Space Agency, Special Forces Division, and Defence Cyber Agency. The idea of AD Command needs to be deliberated professionally at all levels for effective resource utilisation and to ensure enhanced operational efficiency.

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<https://newsable.asianetnews.com/india/air-defence-command-need-to-hasten-slowly-serving-chiefs-best-to-take-calls-qb1ekn>

The Tribune

Fri, 29 May 2020

New policy to constraint defence planning

General Rawat's impromptu strategic guidance on the diminished role for the armed forces has factored the impact of the pandemic on public spending.

India's plans to fight a two-and-half front war will need to be re-evaluated and its self-assigned role as a net regional security provider will also need a fresh look

By Maj Gen Ashok K Mehta (Retd)

To be self-reliant, the government's announcement on May 16 virtually banning defence imports — a boost for Make in India — and allowing 74 per cent FDI in JV through the automatic route, are near revolutionary steps, but requiring the defence procurement procedure (DPP) to be revised for the nth time. These radical policy changes will not be easy to implement and will undermine defence capabilities in the short and medium term.

Therefore, CDS General Bipin Rawat's extraordinary statement earlier this month, charging the armed forces with "misrepresenting their operational requirements to indulge in large weapon import" was embarrassing for the armed fraternity, though pointedly in sync with the government which has been advocating Make in India, a grandiose project for indigenising weapons production that is bereft of any home-grown technology and adequate production base.



Resetting needed: The challenge before General Rawat in a post-Covid environment is daunting but he knows his stuff.

General Rawat said the armed forces should accept weapons from the domestic industry even if they meet just 70 per cent of the desired technology. The admission includes curtailing operational missions and objectives: "We are not expeditionary forces that have to deploy around the globe. We have to guard and fight only along our borders and, of course, dominate the Indian Ocean." He added: "Covid-19 has affected everybody. We need to be realistic, start adjusting and have a major relook at our operational priorities and what we actually need." This was a painful overview of the existing defence planning, weapon acquisition and their prioritisation procedures for which he too, as former Army Chief, is accountable.

It is understood that veterans and serving officers were perturbed with General Rawat's accusation that the services have been exaggerating military threats and that they should fight with weapons with less than the stipulated General Staff Qualitative Requirement.

General Rawat's self-flagellation was also prompted by a defence official disclosing that the defence budget was likely to be slashed between 20 and 40 per cent. As salaries and pensions cannot be cut, defence modernisation will take the hit. This will put a freeze on any new deals and even funds earmarked for paying instalments in the existing contracts could be deferred.

Stockholm International Peace Research Institute (SIPRI) could also be partly to blame for the 'noise' as it has been rating India for the last five years as the world's second biggest arms importer after Saudi Arabia, accounting for 9.2 per cent of total global arms imports. Even so, India spends on an average on defence, just 1.6% of GDP, minus pensions and salaries, which is

one of the lowest among the developing countries, given its two unsettled borders and attendant challenges.

What General Rawat said amounts to a critique of how the country arrives at its defence and security threats, challenges and opportunities. No overarching review coupling defence, diplomacy, technology and economics in the shape of a comprehensive strategic defence and security review has ever been carried out. Nor has any white paper been produced. The Defence Minister's operational directive which is originally drafted by the tri-services gets updated and issued after every five to ten years.

The last time one was refined was during the late Defence Minister Manohar Parrikar's term, but one is not sure whether he finally signed the directive.

The strategic sweep of each service of the armed forces is varied. For the Navy, it is from the east coast of Africa to the Malacca Straits. For the IAF, airspace over territorial India and the Indian Ocean region; and for the continental Army, it is land borders with China, Pakistan, Myanmar and Bangladesh, along with out-of-area contingency plans for the Maldives, Sri Lanka and Nepal. The Indian Army has a manpower ceiling of one million. For the Navy, the ceiling is 60,000 and a target of 200 warships by 2027. The IAF has sought 42 combat squadrons, a figure born in the 1960s, not revised since and never achieved.

General Rawat's impromptu strategic guidance on the diminished role for the armed forces has factored the impact of the pandemic on public spending. India's ambitious plans to fight a two-and-half front war will need to be re-evaluated and its self-assigned role as a net regional security provider will also need a re-examination. The Indian Navy's proposed role in the Indo-Pacific and any militarisation of the Quad will need to be shelved, with focus on the domination of the Indian Ocean region.

Further, General Rawat's remarks, budgetary cuts and import ban will disrupt the 15-year long term integrated perspective plan and require a drastic resetting. The ground reality is this — the LoC has hotted up and infiltration in Kashmir is on the rise. Insurgency will increase exponentially as passes open. Similarly, the LAC has been activated in Ladakh and Sikkim and tension is escalating. Sikkim has a settled border and China accepted it as part of India in 2005. Although the Army Chief, General MM Naravane, has downplayed the two face-offs and rejected any linkage between them, the armed forces must be prepared for a pincer movement by all-weather friends Pakistan and China as well as another Doklam.

Hard power is needed to assert national interest by use of force. Evidently, in view of General Rawat's pronouncements and the government's new defence acquisition policy, full spectrum of capabilities and defence modernisation will be constrained by affordability of programmes in a post-Covid normal.

Instead of considering and announcing piecemeal reforms, like extension of colour service for soldiers, national voluntary service, integrated battle groups and so on, an integrated defence and security review is urgently required on achieving specific joint and individual force capabilities — something that the Defence Planning Staff, of which I was a member, modestly attempted in the mid-80s.

General Rawat's challenge in a post-pandemic environment is daunting, but as the first CDS, he enjoys confidence of the government and knows his stuff.

<https://www.tribuneindia.com/news/comment/new-policy-to-constraint-defence-planning-91289>

IAF Chief exclusive: Rafales arriving July-end; Air Force prepared to counter any threat including two-front war

While preparations are on to receive the French combat aircraft Rafale end of July, the Indian Air Force (IAF) is keen to induct platforms, weapons & systems made here in India

By Huma Siddiqui

While preparations are on to receive the French combat aircraft Rafale end of July, the Indian Air Force (IAF) is keen to induct platforms, weapons & systems made here in India. Air Chief Marshal RK Bhadauria talks with Financial Express Online's Huma Siddiqui on various issues including defence budget, jointness of assets, operational preparedness and fighting COVID-19. Following are excerpts of an interview with the Chief of Air Staff:

With the government planning to cut down imports, global companies who have been bidding for fighters have expressed their concerns. How does the IAF plan to increase the number of fighters?

IAF is highly committed to self-reliance and indigenous production. We have clearly provided our plan for the 83 LCA Mk IA programme followed by LCA Mk II and fifth-generation plus AMCA aircraft. The MRFA programme is also been oriented totally toward Make in India. With the exception of urgent and niche technology procurements, we would induct only make in India platforms, weapons and systems.

Has Hindustan Aeronautics Limited (HAL) shared the timelines for the delivery of Light Combat Aircraft (LCA) for IAF?

The order for 83 MK IA is likely to be placed soon and deliveries will commence in three years. In the long run, the IAF will have 40+83 Tejas Mk I/IA followed by around six squadrons of Tejas Mk II. We expect the production rate of LCAs to be rapidly ramped up to 16 aircraft per year once the 83 LCA contract is signed.

Is it correct that the French fighters Rafales will arrive in July? When exactly are they arriving and if you could please share your experience flying them?

Despite COVID-19 disruptions deliveries are on track in France, however ferry of the first batch to India has been delayed to end July 20. The Rafale aircraft is a highly integrated, agile and smart air combat system. Like all modern fighters it is quite easy to fly. I was quite impressed with the man-machine interface and data fusion. With its immense combat capabilities and ability to integrate with our existing fighter fleets, we will have a very significant enhancement of our overall combat potential and associated deterrence value.

Has IAF prepared a list of items to be put in the Negative List? Will radars, chaffs, air defence systems also be added to the list?

A draft "negative List" had already been prepared and forwarded to the HQ IDS with approx. 60 items and technologies. These include various missiles, radars, EW systems, and CBRN systems. The list is being revised to add more and more technologies and systems that are available within the country and we will provide the details when this gets finalized.

How much has the IAF committed itself to indigenisation? Is India's aerospace industry ready to make fighter jets locally?

The IAF is committed to indigenization and the current reforms and announcements by the government provide a unique opportunity for the Indian aviation sector to collaborate, innovate and establish a self-reliant Aviation industry. The industry will have to commit resources, manpower, money and focus in order to grasp the design development and manufacturing opportunities opened up in this sector based on IAF's acquisition plans that have been clearly explained to the industry.

With all exercises – national and international being put on hold due to the global pandemic, when will the exercises re-start? Will this impact operational preparedness?

The decision on resuming the international exercises will be based on the global Covid-19 situation. Our own training activities continue with all necessary precautions required under COVID 19 and we will ensure that there is no impact on our preparedness.

Are we ready for a two-front war?

The IAF is prepared to counter any threat to the country. Taking into account all possibilities including the possibility of two fronts, IAF is a flexible and agile force with effective responsiveness to engage on multiple fronts. The capability building and our operational philosophies cater to this aspect.

Pooling in & jointness of assets: Naval assets like the P-8I – can these be used in the deserts? Would the naval or IAF pilots fly these?

Integration of all the national air assets for joint operations is feasible and planned. Our planning caters for optimum usage of all available resources and assets in whichever area of operations is necessary. These assets would be operated by their parent service in a planned and integrated manner.

Make in India is the focus of the government. Would the IAF work only with the DPSUs or other PSUs are also in the picture?

To make India self-reliant in defence and succeed on the aviation front, the DPSUs, PSUs, Private Sector, Big Players and MSMEs, all need to rise to the occasion and work together. IAF will work with the entire industry to meet our future requirements indigenously which would not only include acquisition of aircraft and systems but maintenance and lifecycle support. The potential for the aviation industry to deliver is immense.

What do you think about the Space Command?

The creation of Defence Space Agency (DSA) is an interim arrangement until a full-fledged dedicated Aerospace Command is formed. The DSA is a tri-service agency mandated to plan, execute and control all Defence Space-related issues. It will also exercise command and control over all tri-services units and progressively over defence units performing space-related tasks.

Is there any change in DPP?

The revision of DPP 2016 is already underway. It is likely to be finalized and promulgated in the next few months.

Lastly, what has been the contribution of IAF in fighting the COVID-19?

Our plans were initiated proactively catering to force preservation through travel protocols, mandatory quarantine for vulnerable categories and minimising exposure. We took a number of precautions/preventive measures as early as Feb this year such as preparing Isolation and Quarantine centres. By March 2020, we had established quarantine facilities in nine locations across India with a capacity of 1650 personnel. Crisis Management Centres were established at all levels and a Corona helpline for IAF personnel has been functional since the beginning of March. We rapidly implemented specific COVID precautions for our transport and helicopter fleets.

The transport and helicopter aircraft have been working successfully throughout the lockdown period to handle COVID related tasks, support to state administration and Govt agencies as well as air maintenance tasks to support the Indian Army in forward areas. We also carried out the evacuation of citizens from abroad and supplied medical aid to friendly countries. Internally, our training and fighter squadrons' operational methodology was also reviewed to ensure the preservation of operational capability.

For the future we have given detailed instructions on rejoining of people from leave and duty areas and continuation of all operational training and tasks with revised work protocols.

<https://www.financialexpress.com/defence/iaf-chief-exclusive-rafales-arriving-july-end-air-force-prepared-to-counter-any-threat-including-two-front-war/1973835/>

For a reset in India-Nepal relations

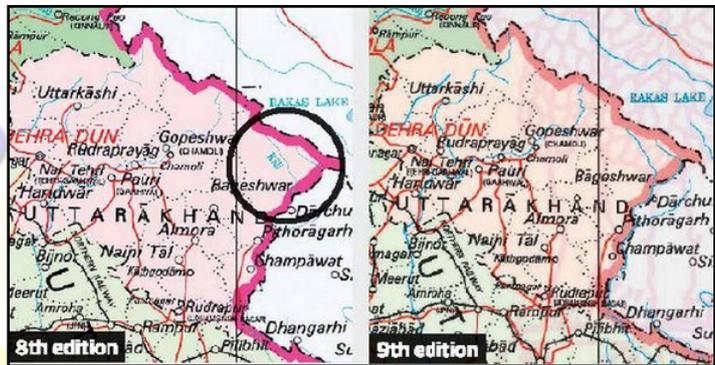
The urgent need today is to pause the rhetoric on territorial nationalism and lay the groundwork for a quiet dialogue

By Rakesh Sood

Once again, relations between India and Nepal have taken a turn for the worse. The immediate provocation is the long-standing territorial issue surrounding Kalapani, a patch of land near the India-Nepal border, close to the Lipulekh Pass on the India-China border, which is one of the approved points for border trade and the route for the Kailash-Mansarovar yatra in Tibet. However, the underlying reasons are far more complex. Yet, Nepali Prime Minister K.P. Sharma Oli's exploitation of the matter, by raising the banner of Nepali nationalism and painting India as a hegemon, is part of a frequent pattern that indicates that relations between the two countries need a fundamental reset.

Kalapani and the maps

India inherited the boundary with Nepal, established between Nepal and the East India Company in the Treaty of Sugauli in 1816. Kali river constituted the boundary, and the territory to its east was Nepal. The dispute relates to the origin of Kali. Near Garbyang village in Dharchula Tehsil of the Pithoragarh district of Uttarakhand, there is a confluence of different streams coming from north-east from Kalapani and north-west from Limpiyadhura. The early British survey maps identified the north-west stream, Kuti Yangti, from Limpiyadhura as the origin, but after 1857 changed the alignment to Lipu Gad, and in 1879 to Pankha Gad, the north-east streams, thus defining the origin as just below Kalapani. Nepal accepted the change and India inherited this boundary in 1947.



The Maoist revolution in China in 1949, followed by the takeover of Tibet, created deep misgivings in Nepal, and India was 'invited' to set up 18 border posts along the Nepal-Tibet border. The westernmost post was at Tinkar Pass, about 6 km further east of Lipulekh. In 1953, India and China identified Lipulekh Pass for both pilgrims and border trade. After the 1962 war, pilgrimage through Lipulekh resumed in 1981, and border trade, in 1991.

In 1961, King Mahendra visited Beijing to sign the China-Nepal Boundary Treaty that defines the zero point in the west, just north of Tinkar Pass. By 1969, India had withdrawn its border posts from Nepali territory. The base camp for Lipulekh remained at Kalapani, less than 10 km west of Lipulekh. In their respective maps, both countries showed Kalapani as the origin of Kali river and as part of their territory. After 1979, the Indo-Tibetan Border Police has manned the Lipulekh Pass. In actual practice, life for the locals (Byansis) remained unchanged given the open border and free movement of people and goods.

After the 1996 Treaty of Mahakali (Kali river is also called Mahakali/Sarada further downstream) that envisaged the Pancheshwar multipurpose hydel project, the issue of the origin of Kali river was first raised in 1997. The matter was referred to the Joint Technical Level Boundary Committee that had been set up in 1981 to re-identify and replace the old and damaged boundary pillars along the India-Nepal border. The Committee clarified 98% of the boundary, leaving behind the unresolved issues of Kalapani and Susta (in the Terai) when it was dissolved in 2008. It was subsequently agreed that the matter would be discussed at the Foreign Secretary level. Meanwhile, the project to convert the 80-km track from Ghatibagar to Lipulekh into a hardtop road began in 2009 without any objections from Nepal.

The Survey of India issued a new political map (eighth edition) on November 2, 2019, to reflect the change in the status of Jammu and Kashmir as two Union Territories. Nepal registered a protest though the map in no way had changed the boundary between India and Nepal. However, on November 8, the ninth edition was issued. The delineation remained identical but the name Kali river had been deleted. Predictably, this led to stronger protests, with Nepal invoking Foreign Secretary-level talks to resolve issues. With the Indian Ambassador Manjeev Puri in Kathmandu retiring in end-December and Foreign Secretary Vijay Gokhale retiring a month later, the matter remained pending despite reminders from Kathmandu.

Nepali nationalism

By April 2020, Mr. Oli's domestic political situation was weakening. Under the Nepali Constitution, a new Prime Minister enjoys a guaranteed two-year period during which a no-confidence motion is not permitted. This ended in February unleashing simmering resentment against Mr. Oli's governance style and performance. His inept handling of the COVID-19 pandemic added to the growing disenchantment. Within the Nepal Communist Party (NCP) there was a move to impose a 'one man, one post' rule that would force Mr. Oli to choose between being NCP co-chair or Prime Minister.

The re-eruption of the Kalapani controversy, when Defence Minister Rajnath Singh did a virtual inauguration of the 80-km road on May 8, provided Mr. Oli with a political lifeline. A subsequent comment by the Chief of the Army Staff (COAS), General Manoj Naravane, on May 15 that "Nepal may have raised the issue at the behest of someone else" was insensitive, given that the Indian COAS is also an honorary general of the Nepal Army and vice-versa, highlighting the traditional ties between the two armies.

Mr. Oli had won the election in 2017 by flaunting his Nepali nationalism card, the flip side of which is anti-Indianism. This is not a new phenomenon but has become more pronounced in recent years. Mr. Oli donned the nationalist mantle vowing to restore Nepali territory and marked a new low in anti-Indian rhetoric by talking about "the Indian virus being more lethal than the Chinese or the Italian virus".

A new map of Nepal based on the older British survey reflecting Kali river originating from Limpiyadhura in the north-west of Garbyang was adopted by parliament and notified on May 20. On May 22, a constitutional amendment proposal was tabled to include it in a relevant Schedule. The new alignment adds 335 sq km to Nepali territory, territory that has never been reflected in a Nepali map for nearly 170 years.

This brief account illustrates the complexity underlying India-Nepal issues that cannot be solved by rhetoric or unilateral map-making exercises. Such brinkmanship only breeds mistrust and erodes the goodwill at the people-to-people level. Political maturity is needed to find creative solutions that can be mutually acceptable.

Rewriting the fundamentals

Prime Minister Narendra Modi has often spoken of the "neighbourhood first" policy. He started with a highly successful visit to Nepal in August 2014. But the relationship took a nosedive in 2015 when India first got blamed for interfering in the Constitution-drafting in Nepal and then for an "unofficial blockade" that generated widespread resentment against the country. It reinforced the notion that Nepali nationalism and anti-Indianism were two sides of the same coin that Mr. Oli exploited successfully.

In Nepali thinking, the China card has provided them the leverage to practise their version of non-alignment. In the past, China maintained a link with the Palace and its concerns were primarily related to keeping tabs on the Tibetan refugee community. With the abolition of the monarchy, China has shifted attention to the political parties as also to institutions like the Army and Armed Police Force. Also, today's China is pursuing a more assertive foreign policy and considers Nepal an important element in its growing South Asian footprint.

The reality is that India has ignored the changing political narrative in Nepal for far too long. India remained content that its interests were safeguarded by quiet diplomacy even when Nepali

leaders publicly adopted anti-Indian postures — an approach adopted decades earlier during the monarchy and then followed by the political parties as a means of demonstrating nationalist credentials. Long ignored by India, it has spawned distortions in Nepali history textbooks and led to long-term negative consequences. For too long India has invoked a “special relationship”, based on shared culture, language and religion, to anchor its ties with Nepal. Today, this term carries a negative connotation — that of a paternalistic India that is often insensitive and, worse still, a bully.

It is hardly surprising that the 1950 Treaty of Peace and Friendship which was sought by the Nepali authorities in 1949 to continue the special links it had with British India and provides for an open border and right to work for Nepali nationals is viewed as a sign of an unequal relationship, and an Indian imposition. Yet, Nepali authorities have studiously avoided taking it up bilaterally even though Nepali leaders thunder against it in their domestic rhetoric.

The urgent need today is to pause the rhetoric on territorial nationalism and lay the groundwork for a quiet dialogue where both sides need to display sensitivity as they explore the terms of a reset of the “special relationship”. A normal relationship where India can be a generous partner will be a better foundation for “neighbourhood first” in the 21st century.

(Rakesh Sood is a former diplomat and currently Distinguished Fellow at the Observer Research Foundation)

<https://www.thehindu.com/opinion/lead/for-a-reset-in-india-nepal-relations/article31697691.ece>



Fri, 29 May 2020

What is China's 'Wolf Warrior Diplomacy', and how does it concern India. Former Army General tells India TV

China is resorting to 'Wolf Warrior Diplomacy' in Ladakh as Indian Army and Chinese PLA look eyeball to eyeball over disagreements on the demarcation of the Line of Actual Control (LAC), Indian Army Gen (Retd) Abhay Krishna tells India TV

New Delhi: China is resorting to 'Wolf Warrior Diplomacy' in Ladakh as Indian Army and Chinese PLA look eyeball to eyeball over disagreements on the demarcation of the Line of Actual Control (LAC), former Indian Army General tells India TV. In an exclusive conversation, Lt Gen Abhay Krishna has said that China's 'Wolf Warrior Diplomacy' doctrine deals with extracting leverages in any way possible before carrying out traditional diplomacy.

"China is resorting to Wolf Warrior Diplomacy doctrine wherein it tries to get as much leverage over the other country before carrying out traditional diplomacy," Gen Abhay Krishna said.

The Rajputana Rifles veteran, who has also served as the General Officer Commanding (GOC) Delhi Area, also pointed out the Pakistan connection in this face-off. "One must ponder upon the fact the in the last 11-12 years Chinese PLA has been moving westwards. Their exercises and military establishments have been slowly moving towards our western border (Pakistan). This is because Gilgit Baltistan is very critical for China. It is the main stay for the China Pakistan Economic Corridor (CPEC) and China has made massive investments there."

He further reiterated that if India gets its hands on Gilgit Baltistan, China will be in a big fix, strategically and economically.

<https://www.indiatvnews.com/news/india/india-china-standoff-ladakh-lac-wolf-warrior-diplomacy-indian-army-general-621213>



Fri, 29 May 2020

Private players welcome in India's space journey but ISRO needs an organizational revamp to focus on R&D

By Sidharth MP

In a recent press conference, India's Finance Minister Nirmala Sitaraman announced that the private sector will be a co-traveller in India's Space journey. The announcement was made as a part of Policy reforms to fast-track Investment effort towards Atmanirbhar Bharat (Self-reliant India). But beyond the participation of private players and industry partners, ISRO needs much more impetus from within and outside in order to establish itself as a big player in the highly-competitive 21st century Global market.

Today, ISRO is fully dependent on two launch vehicles in the PSLV and GSLV series, both of which were conceptualized back in the 1970s and 80s. While ISRO has innovated and performed inter-planetary, deep space exploration missions with these (lesser-power) rockets, India is nowhere near self-reliance in terms of launch capability. It is lamentable, that in the last 27 years our Space agency hasn't developed an engine (fuelled by earth-storable propellants) that is more powerful than the Vikas Engine, which was based on the French Viking Engine.



India still pays for the French Rocket Ariane V to launch our own satellites that weigh over 4-tons. This highlights the pressing need for more powerful high-thrust liquid propulsion engines and cryogenic engines that can improve the payload capacity of our rockets, especially at a time when India is aiming for manned missions (Gaganyaan).

For perspective, the SpaceX Falcon 9 rocket (their smallest) can lift twice as much payload as India's most powerful rocket the GSLV Mark III. SpaceX most powerful rocket Falcon Heavy can lift six times as much payload as the Mark III. So when foreign customers approach ISRO, it is only for launching the smallest of their satellites, most of which are built by start-ups and students. Launching such small payloads does bring in revenue, but this amounts to hardly anything. ISRO's share of the \$350 billion global space market is barely 2 per cent.

"Private participation is welcome in production of existing rocket engines and in providing propellants, but ISRO must strictly remain focused on Research and Development. ISRO can keep the R&D of launch vehicles and thrusters with itself, due to the sensitive nature of the technology. However, we must also urgently develop launch vehicles with payload capacity of at least 10-12 tons (thrice as much as current limit) to meet our national requirement", S. Nambi Narayanan, Retd. Project Director 2nd, 4th stage of PSLV, Cryogenic Engine told WION.

In terms of satellites, ISRO has been designing and fabricating a wide range of them that are being used for communication, imaging, weather monitoring, remote-sensing, strategic purposes etc. However, this is also a field that can be thrown open to the private sector in a bigger way. It could mean allowing private players to conduct home-grown research and development in satellite technology and also the capability of building them indigenously based on the requirements of

various agencies. Also ISRO would need to start building state-of-the art satellites that can also be sold to foreign customers. Presently, ISRO is only launching foreign satellites for a cost, but there's a considerable market in fabricating satellites for customers.

“Now we have engineers from the private sector who are trained by ISRO for integrating satellites and manufacturing hardware. They take part in testing and qualifying the hardware. While ISRO has the facility to build 20 satellites simultaneously, we don't have the required manpower and that's where private talent can come in. We should have a scenario where private players can build satellites as per the needs of foreign customers”, Dr. Mylswamy Annadurai, Retd. Director, U.R. Rao Satellite Centre and Project Director Chandrayaan 1 told WION.

Given the large number of Indian agencies using ISRO satellites and their data, a system could be evolved where specific, mission-oriented satellites are launched based on the needs of the user. The user agency must also have the freedom to choose a private or an ISRO facility to fabricate the satellite on a payment basis. This would avoid the under-utilization of satellites arising from poor inter-agency coordination.

It is said that ISRO's first launch from Sriharikota this year, that was slated for March 5th had to be called off as the user agency, ground interface was not prepared to utilize the data that would be provided by the satellite. Earth Observation satellite GISAT-1 was to be launched into Geostationary orbit by the GSLV Mark II rocket. Likewise, the GSAT-11, which is among the heaviest satellites built by ISRO is said to be unused since its launch in late 2018, as the ground interface and user-agencies weren't prepared.

“Operating satellites require excellent communications, ground stations and other infrastructure. Development of ground stations, terminals and software are also a big avenue for the private sector to explore. The competition rising from ideas, innovation and talent of the private sector is required to shake the inertia of ISRO” Dr. Annadurai added.

If we are to envision rocket launches by private industries from ISRO's spaceport, then the country needs to revisit and update its age-old Space laws which were drafted two decades ago. There must also be a clear Space Policy that outlines what is ISRO's mission and the plan for future deep-space exploration. Additional regulatory guidelines are also needed to codify the responsibilities of every participating agency and private industry.

“Let's say, God forbid, something goes wrong in a launch (in which a private player has a major role), who would take responsibility? There are liabilities involved and who would pay? There are so many commitments involved and our country would be answerable for any damage that may arise. We can't point fingers after a mishap, we must proactively get a detailed framework”, Dr. G. Madhavan Nair, Retd. Chairman, ISRO told WION.

Given the nature of space science where investments are high and returns are gradual, our policy makers must keep in mind that a considerable level of hand-holding would be necessary, when throwing the doors open for private industries. However, for reasons unknown, ISRO too has not been very enthused about allowing major private participation so far.

“Considering the Indian scenario, replicating the US model of total privatization would be irrelevant, as US firms are military-funded and we in India don't have a worthy aerospace industry. However, like Europe we can have government funding, along with industry support.” Dr. Nair added.

Looking at post-launch, commercial utility of communication satellites need to be explored further. It's not just about private firms fabricating, assembling and launching satellites, but providing satellite communication services must be looked into. These services include leasing transponders for TV broadcasting, broadband services and many other ways of generating income.

Dr. Annadurai says that this field has immense potential if we clear some hurdles. “The key issue is managing the vital frequency spectrum and this must be addressed by our policy makers. Young talent with fresh ideas from the private industry can infuse innovative solutions for effective use of communications frequencies thereby bringing greater connectivity speeds that can enable a

truly Digital India. Policy on usage of remote sensing satellite data would also draw more private players into space-tech” he added.

There is also a further need to re-organize ISRO’s activities from within, in order to achieve operational efficiency. This would mean keeping the routine tasks such as rocket launching, tracking and station-keeping of satellites under one division. Perhaps, in the longer run when the true potential of private industry has been unlocked, these tasks could also be handed over to the private sector, thus enabling ISRO to focus on the core task of Research and development.

When we consider that ISRO was officially instituted in 1969 (at the start, in 1962 it was called INCOSPAR), the same year when America put man on the moon, we must take pride in the fact that we have come thus far. ISRO must also be lauded for developing several critical technologies indigenously, but ISRO must not rest on its laurels. India’s formidable foundation and experience in space technology needs to be fine-tuned for the 21st century requirements, where foreign private companies are making rapid strides, not only in rocket-launching but also in private space travel and deep-space exploration. A good start for ISRO would be to immediately develop a higher-thrust liquid engine (propelled by Earth-Storable liquids) and a cryogenic engine for itself, besides state-of-the art satellites that can compete in the international market.

<https://zeenews.india.com/india/private-players-welcome-in-india-s-space-journey-but-isro-needs-an-organizational-revamp-to-focus-on-rd-2286556.html>



Indian space tech startup company, Vestaspace Technology, is planning to launch a constellation of over 35 satellites across India in a bid to build 5G network connections and IoT functionalities across various industries.

The company is planning to launch a beta version of its satellite constellation in September this year. It will launch the fully operational satellite constellation into the Low-Earth-Orbit (LEO) or Geosynchronous Equatorial Orbit (GEO) in early 2021.

The move is aimed at replacing the traditional fiber networks with the satellite constellation that will provide high-speed 5G network connection using unmanned Software Data processing. To achieve this, Vestaspace has come with a concept of services wherein a user can uplink and downlink the data while browsing the internet. The company also envisages 10 layers of security Firewall being put in place to avoid any illegitimate or fraudulent actions.



“To solve the complex system and to provide 5G internet network solutions to the Urban, Rural and unserved regions, we have positioned 8 Ground Stations and 31,000 data receptors all over India. This is made possible with the help of accurate positioning and telemetry related activities,” Arun Kumar Sureban Vestaspace Founder & CEO said in a statement.

“We are on a mission to make space accessible to everyone who once thought satellites were rocket science,” he added.

<https://www.defencenews.in/article/Indian-startup-to-launch-35-5G-satellites-across-India-840810>

Introducing a new satellite-based quantum-secure time transfer (QSTT) protocol

Quantum satellite to ensure time information security

By Pranjali Mehar

Quantum key distribution (QKD) is a procedure to accomplish secure communication that uses cryptographic protocols dependent on the laws of quantum mechanics. Quantum key distribution protocols can create secret security keys based on quantum physics, empowering progressively secure data transfer between various devices by spotting assailants who are attempting to capture communications.

In a new study, scientists at the University of Science and Technology of China used a similar principle to exploit quantum signals (i.e., single photons) as carriers for what is known as time transfer. They have come up with a new satellite-based quantum-secure time transfer (QSTT) protocol that could enable more secure communications between different satellites or other technology in space.

Feihu Xu, one of the researchers who carried out the study, said, “Thanks to the quantum non-cloning theorem we used, any attempt to intercept the single-photon will inevitably disturb the quantum state, which can be checked via post-processing. This allowed us to attain a quantum-secure time transfer scheme.”

This new protocol has been demonstrated by applying it to the Micius quantum satellite. The time precision it achieved is remarkable than that of T2L2, a state-of-the-art technique to achieve time transfer that was applied on the Jason-2 satellite, which is based on the use of intense classical laser pulses.

Xu said, “We performed a satellite-to-ground time synchronization using single-photon-level signals and achieved a quantum bit error rate of less than 1%, a time data rate of 9 kHz and a time-transfer precision of 30 ps.”

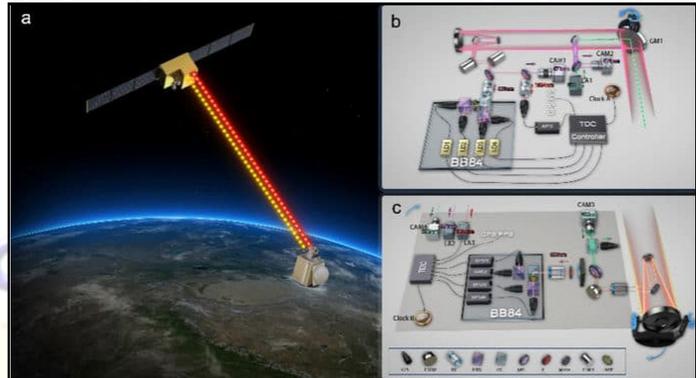
Scientists also demonstrated the feasibility of achieving satellite-based high-precision time transfer with single photons; their work also opens up new exciting possibilities for future research.

Xu said, “Our work introduces new perspectives for the physics field to exploit quantum technology to attain greater security and higher accuracy for time-frequency transfer, clock synchronization and quantum networks of clocks. We now plan to construct a satellite-based global-scale quantum network to test fundamental physics and to provide practical applications, such as distributing secret keys, synchronizing clocks, and so forth.”

Journal Reference:

1. Hui Dai et al., Towards satellite-based quantum-secure time transfer. [DOI: 10.1038/s41567-020-0892-y](https://doi.org/10.1038/s41567-020-0892-y)

<https://www.techexplorist.com/introducing-new-satellite-based-quantum-secure-time-transfer-qstt-protocol/32604/>



Picture of the experimental device. Credit: University of Science and Technology of China

WPI-led research team shrinks breast cancer tumors in mice with targeted therapy

Article in Scientific Reports describes drugs that targeted triple-negative breast cancer without toxic side effects

Worcester, Mass. - May 28, 2020 - A team of researchers led by Worcester Polytechnic Institute (WPI) Provost Wole Soboyejo has identified targeted drugs that reduced the sizes of hard-to-treat breast cancer tumors in mice without inducing the toxic side effects that are typically associated with conventional chemotherapy.

The researchers said in an article published in *Scientific Reports* that a molecular recognition unit attached to drugs specifically targeted "triple-negative" breast cancer tumors, which typically do not respond to targeted therapies. The targeted drugs eliminated or reduced the sizes of breast cancer tumors in laboratory experiments that were performed on mice. No toxic side effects were observed in the experiments.

"When injected into the bloodstream, only a small fraction of traditional chemotherapeutic drugs reaches tumors," Soboyejo said. "It usually takes relatively high concentrations of conventional cancer drugs to have therapeutic effects on tumors. Hence, such concentrations are often toxic to other cells. In our case, the targeting drugs were more effective at shrinking and eliminating triple-negative breast tumors in mice. They also eliminated tumors without inducing toxicity."

Breast cancer is the most commonly diagnosed cancer in women. Chemotherapy kills fast-growing tumor cells by flooding a patient's body with potent drugs, but the treatment often produces toxic side effects. Targeted therapy aims to reduce side effects by delivering chemotherapeutic drugs directly to breast cancer tumor cells. The drugs seek out and bind to specific cellular structures known as receptors.

Three common receptors that are over-expressed on the surfaces of breast cancer tumor cells are HER2, a growth factor, as well as estrogen and progesterone hormones. Most breast cancer treatments target HER2 receptors. However, between 10% and 17% of all breast cancers lack HER2, estrogen, and progesterone receptors. These "triple-negative" breast cancers are more prevalent in younger women, African American women, and African women.

Soboyejo, inspired by a relative's battle with breast cancer, previously studied luteinizing hormone-releasing hormone (LHRH) as a targeting mechanism to deliver magnetic nanoparticles to breast tumors. The targeted magnetic nanoparticles were found to improve the imaging of breast tumors in nude mice, a type of laboratory mouse. LHRH is a naturally occurring hormone in mammals. It is essential for reproduction.

More recently, Soboyejo began studying LHRH as a targeting mechanism for chemotherapeutic drugs. His work has been funded by WPI and the Pan African Materials Institute at the African University of Science and Technology (AUST) in Abuja, Nigeria, which is funded by the World Bank.

In this study, the researchers attached the chemotherapy drug paclitaxel to LHRH. They also attached prodigiosin, a natural substance with anti-cancer properties, to LHRH. Both combination molecules were tested against triple-negative breast cancer cells and tissues.

Soboyejo's team hopes to continue work on LHRH-targeted nanoparticles and therapeutic drugs, and to position them for human clinical trials on breast cancer patients. The group is also working to identify other targeted drugs and nanoparticles for the detection and treatment of other tumors.

"The fact that we could target triple-negative breast cancer in mice models is important. However, I think this method has major implications for targeted cancer treatment in general," Soboyejo said.

Co-authors on the article are, from WPI, John Obayemi, assistant research professor of mechanical engineering; Ali Salifu, assistant research professor of mechanical engineering; Vanessa Uzonwanne, doctoral student in materials science and engineering; and Jean King, dean of arts and sciences. Co-authors from the University of Massachusetts Medical School are Ogooluwa Ojelabi, postdoctoral researcher; Laurelle Payne, research technician; and Constance Moore, associate professor. Other co-authors are Stanley Eluu of Nnamdi Azikiwe University, Nigeria; and Sandra Jusu, Clare Nwazojie, and Maria Onyekanne, PhD students at AUST.

About Worcester Polytechnic Institute

WPI, the global leader in project-based learning, is a distinctive, top-tier technological university founded in 1865 on the principle that students learn most effectively by applying the theory learned in the classroom to the practice of solving real-world problems. Recognized by the National Academy of Engineering with the 2016 Bernard M. Gordon Prize for Innovation in Engineering and Technology Education, WPI's pioneering project-based curriculum engages undergraduates in solving important scientific, technological, and societal problems throughout their education and at more than 50 project centers around the world. WPI offers more than 50 bachelor's, master's, and doctoral degree programs across 14 academic departments in science, engineering, technology, business, the social sciences, and the humanities and arts. Its faculty and students pursue groundbreaking research to meet ongoing challenges in health and biotechnology; robotics and the internet of things; advanced materials and manufacturing; cyber, data, and security systems; learning science; and more. <http://www.wpi.edu>

https://www.eurekalert.org/pub_releases/2020-05/wpi-wrt052820.php

COVID-19 Research News

THE TIMES OF INDIA

Fri, 29 May 2020

CCMB taps green monkey to culture virus, make Covid vaccine

Hyderabad: Centre for Cellular and Molecular Biology (CCMB) researchers have isolated coronavirus (SARS-CoV-2) and the lab's ability to culture it will enable the scientists to work on vaccine development and test potential drugs to fight Covid-19. In the past one-and-half month, CCMB researchers have established stable cultures of SARS-CoV-2, the virus which causes Covid-19, from the samples of positive patients. CCMB would donate the virus culture to other authorised centres carrying on research on coronavirus-related vaccines and drugs.

Dr Krishnan H Harshan, a virologist at CCMB said: "Currently, primary epithelial cells generated from human origin do not grow for many generations in labs, which is a key to culturing viruses continuously. Labs which are growing the virus need an 'immortal' cell line". Vero cells — kidney epithelial cell lines from African green monkey, which express ACE-2 proteins and carry a mutation that allows viruses to proliferate indefinitely— are used." CCMB said the efficacy of inactivated SARS-CoV-2 as a vaccine candidate was currently being investigated by several groups.

CCMB director Dr Rakesh Mishra said: "Using the vero cell lines to grow the coronavirus, CCMB is now in a position to isolate and maintain viral strains from different regions. We are working towards producing viruses in huge quantities that can be inactivated, and used in vaccine development and antibody production for therapeutic purposes."

“We have started testing potential drugs with other partners such as DRDO. We hope that such systems are replicated at multiple research institutes and private companies to become a useful resource in the fight against the current pandemic as well as for future preparedness,” he added. “Phase I of antiviral drug trial is based on the effect of a potential drug on limiting the replication of virus” CCMB experts said.

<https://timesofindia.indiatimes.com/city/hyderabad/ccmb-taps-green-monkey-to-culture-virus-make-vaccine/articleshow/76080489.cms>



Fri, 29 May 2020

New Research: In review, what Covid-19 does to central nervous system

A new study has reviewed the existing evidence about the coronavirus's impact on the central nervous system.

New Delhi: As a respiratory disease, Covid-19 primarily attacks the lungs, but other effects too have been emerging, including in the abdomen, the skin and the brain. A new study has reviewed the existing evidence about the last: the virus's impact on the central nervous system. Researchers from the University of Cincinnati and three Italian institutions have reviewed neuroimaging and neurological symptoms in patients with Covid-19 and published their findings in the journal Radiology.

Altered mental status and stroke have been found to be the most common neurological symptoms in Covid-19 patients. The authors say this could help physicians notice red flags earlier.

“Studies have described the spectrum of chest imaging features of COVID-19, but only a few case reports have described COVID-19 associated neuroimaging findings,” lead author

Abdelkader Mahammedi, assistant professor of radiology at the University of Cincinnati, said in a statement. “To date, this is the largest and first study in literature that characterizes the neurological symptoms and neuroimaging features in COVID-19 patients. These newly discovered patterns could help doctors better and sooner recognize associations with COVID-19 and possibly provide earlier interventions.”

Researchers investigated neurological symptoms and imaging findings in patients from three major institutions in Italy: University of Brescia; University of Eastern Piedmont (Novara); and University of Sassari. The study included images from 725 hospitalised patients with confirmed Covid-19 infection between February 29 and April 4. Of these, 108 (15%) had serious neurological symptoms and underwent brain or spine imaging. Most patients (99%) had brain CT scans, while 16% had head and neck CT imaging and 18% had brain MRI.

Investigators found that 59% of patients reported an altered mental state and 31% experienced stroke, which were the most common neurological symptoms. Patients also experienced headache (12%), seizure (9%) and dizziness (4%), among other symptoms. Altered mental status was more common in older adults.

<https://indianexpress.com/article/explained/in-review-what-covid-19-does-to-central-nervous-system-6430333/>



ब्रिटेन में पांच लाख लोगों पर हुई स्टडी में खुलासा, इस जीन से है कोरोना वायरस का अधिक खतरा

लाइफस्टाइल डेस्क, अमर उजाला, नई दिल्ली: कोरोना वायरस (Coronavirus) का संक्रमण आए दिन बढ़ता ही जा रहा है। दुनियाभर के 200 से ज्यादा देशों में कोरोना अपना पांव पसार चुका है। इसके लक्षणों से लेकर इसकी दवा और वैक्सीन के लिए विभिन्न देशों में वैज्ञानिक शोध कर रहे हैं। हर दिन इस वायरस को लेकर नए-नए शोध सामने आ रहे हैं। कई शोध के परिणाम चौंकाने वाले होते हैं। हाल ही में ऐसे ही एक शोध अध्ययन की रिपोर्ट सामने आई है, जिसमें शोधकर्ताओं को कोरोना वायरस का खतरा बढ़ाने वाले जीन के बारे में पता चला है। इस जीन का संबंध मस्तिष्क से जुड़ी बीमारी डिमेंशिया से है। आइए जानते हैं इस बारे में विस्तार से:

पांच लाख लोगों के डाटा का विश्लेषण

ब्रिटेन में बड़े पैमाने पर यह स्टडी हुई है, जिसमें पांच लाख लोगों के डाटा पर अध्ययन किया गया है। इस रिसर्च स्टडी में बताया गया है कि डिमेंशिया (Dementia) का खतरा बनने वाले जीन के कारण कोरोना वायरस (COVID-19) होने का खतरा और ज्यादा बढ़ सकता है।

डिमेंशिया है क्या?

मालूम हो कि डिमेंशिया मस्तिष्क से जुड़ी ऐसी बीमारी है, जिससे पीड़ित व्यक्ति की सोचने-समझने की क्षमता खत्म होने लगती है और उसकी याददाश्त भी धीरे-धीरे चली जाती है। इस बीमारी से पीड़ित मरीजों को कोई भी निर्णय लेने में परेशानी होती है। पहले हुए कई शोध अध्ययन में कोरोना पीड़ित मरीजों में मानसिक विक्षिप्तता के शुरुआती लक्षण भी देखे जा चुके हैं।

ई4ई4 जीन है कारण

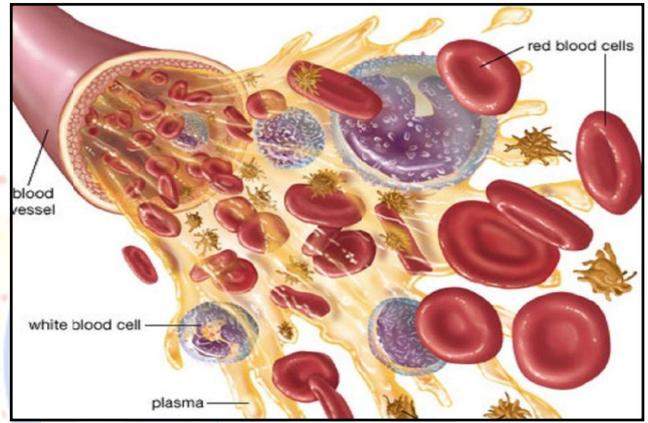
जर्नल ऑफ जेरोटोलॉजी में प्रकाशित इस स्टडी के मुताबिक वायरस ऐसे लोगों में ज्यादा पाया गया है, जिनमें डिमेंशिया से जुड़ा यह जीन मौजूद होता है। इस स्टडी के मुताबिक, ऐसे लोगों को कोरोना संक्रमण का खतरा ज्यादा होता है, जो गड़बड़ एपीओई या ई4ई4 (e4e4 gene) नामक जीन के वाहक होते हैं।

हर 36वें कोरोना संक्रमित में यही जीन

ब्रिटेन की यूनिवर्सिटी ऑफ एक्सेटर मेडिकल स्कूल के शोधकर्ताओं के मुताबिक, अनुसार, ब्रिटेन के करीब पांच लाख लोगों पर यह अध्ययन किया गया है और उसी आधार पर डाटा विश्लेषण हुआ है। इस विश्लेषण में शोधकर्ताओं ने पाया कि कोरोनावायरस से संक्रमित हर 36वें व्यक्ति में यह जीन मौजूद है।

इस जीन के कारण दोगुना खतरा

कोरोना महामारी को लेकर शोधकर्ताओं ने कहा कि इस जीन के वाहकों में कोरोना वायरस का खतरा दोगुना अधिक होता है। मालूम हो कि पहले हुए एक शोध में भी शोधकर्ता बता चुके हैं कि डिमेंशिया से पीड़ित लोगों को कोरोना वायरस से संक्रमित होने का खतरा तीन गुना ज्यादा होता है।



प्रतीकात्मक तस्वीर

दिल की बीमारी और अल्जाइमर का भी खतरा

शोधकर्ताओं का कहना है कि इस ई4ई4 (e4e4 gene) जीन के कारण मरीजों में भूलने की बीमारी अल्जाइमर का खतरा 14 गुना अधिक हो सकता है। वहीं, इसी जीन के कारण दिल से संबंधित बीमारी का खतरा भी बढ़ सकता है।

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