

Aug
2020

समाचार पत्रों से चयित अंश Newspapers Clippings

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

Volume: 45 Issue: 195 21 August 2020



रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाउस, दिल्ली - 110 054
Metcalf House, Delhi - 110 054

CONTENT

S. No.	TITLE	Page No.
DRDO News		1-6
COVID-19: DRDO's Contribution		1
1.	Clinical trials for 2 vaccines get green signal	1
DRDO Technology News		2-6
2.	First rockets produced by private sector successfully test fired	2
3.	100% made by private sector – India successfully test fires multi barrel Pinaka rockets	3
4.	NAG Missile carrier NAMICA-2 to dramatically boost Indian Army's firepower against China	4
5.	As Tejas begins flying near Pakistan border, IAF & HAL join hands to boost LCA availability	5
Defence News		7-14
Defence Strategic National/International		7-14
6.	भारतीय सेना को जल्द मिलेगी स्वदेशी Bharat 52 गन, कुछ सेकंडों में ही गोलियों की बौछार	7
7.	Boeing testing Super Hornet fighter from 'ski-jump' for Indian Navy deal	8
8.	Seven active Chinese military air bases under close watch of Indian agencies	10
9.	India's electronic warfare units are archaic, but camouflage, concealment can blunt PLA	11
10.	China increases surveillance on Indian Army's central sector amid border tension along LAC: Intelligence report	13
Science & Technology News		15-31
11.	Space activities bill submitted to PMO, Cabinet nod soon; ISRO is not being privatised: Sivan	15
12.	This is how govt plans to bring together ISRO, private players to boost India's space sector	16
13.	Chandrayaan-2 completes a year around Moon, adequate fuel for 7 more years: ISRO	17
14.	A new kind of plastic that is able to maintain its original qualities when recycled	18
15.	A quantum thermometer to measure the coldest temperatures in the universe	20
16.	Some bacteria sacrifice themselves to protect their brethren from antibiotics	22
17.	Scientists develop 'biorubber' glue for faster surgical recovery and pain relief	23
18.	Self-excited dancing droplets	25
COVID-19 Research News		26-31
19.	Machine-learning model finds SARS-COV-2 growing more infectious	26
20.	Covid-19: Children are silent spreaders of coronavirus, study finds	27
21.	Serum Institute registers its Covid-19 vaccine trial	28
22.	Russia looking for partnership with India to produce Covid vaccine: RDIF CEO	29
23.	Bharat Biotech wants to test administering Covid vaccine through skin instead of muscle	30

THE TIMES OF INDIA

Fri, 21 Aug 2020

Clinical trials for 2 vaccines get green signal

Visakhapatnam: The state government has given approval for conducting phase-II and phase-III clinical trials for two proposed Covid-19 vaccines at Andhra Medical College-King George Hospital (AMC-KGH), Visakhapatnam. A communique from the Directorate of Medical Education (DME) was received in this regard.

Speaking on the trials, principal of AMC and superintendent of KGH, Dr PV Sudhakar said, "Phase-II clinical trial of CRO Navitas Life Sciences for the acute treatment of moderate to severe Covid-19 cases would be undertaken. The study has the support of the Defence Research and Development Organisation (DRDO). Dr Y Gyana Sundar Raju, professor of general medicine has been appointed as principal investigator for the study."

The other clinical trial will be a phase-II or III single blind randomised control study to determine the safety and immunogenicity of the vaccine developed by the Serum Institute of India. The study has the support of the Indian Council of Medical Research (ICMR). Dr B Devi Madhavi, professor of community medicine will be the principal investigator. A team of experts from various departments are co-investigators in the studies.

In June, the ICMR had selected AMC-KGH as one of the 12 institutes in the country to conduct clinical trials for Bharat Biotech's Covaxin. However, government officials said the clinical trial could not take off as the ICMR did not have the state government's permission to select a state-run institute for conducting clinical trials, against set protocol.

The DME had also stated it would adopt a wait and watch policy based on results from the other 11 institutes.

<https://timesofindia.indiatimes.com/city/vijayawada/clinical-trials-for-2-vaccines-get-green-signal/articleshow/77660819.cms>

First rockets produced by private sector successfully test fired

By Manu Pubby

Synopsis

The Pinaka rockets were tested at a firing range in Pokharan on Wednesday and achieved the desired results by accurately hitting targets. The rockets have been manufactured by the private sector after a technology transfer agreement with the Defence Research and Development Organisation (DRDO).

New Delhi: In a major boost for Make in India, the first ever rockets fully manufactured by the private sector have been successfully test fired by the army, signalling that single source dependency on Ordnance Factory Board (OFB) will soon be a thing of the past.

The Pinaka rockets were tested at a firing range in Pokharan on Wednesday and achieved the desired results by accurately hitting targets. The rockets have been manufactured by the private sector after a technology transfer agreement with the Defence Research and Development Organisation (DRDO).

Sources said that six Pinaka rockets were test fired as part of the final developmental trials. The rockets have been manufactured by Economic Explosives Ltd (EEL) and are the first munition of its kind made by the private sector in India. They are also a success story for DRDO that has been engaging with the private sector to transfer manufacturing technology for home developed systems.



Representative image

In the past, munitions of this class have either been imported or have been manufactured by the public sector, with repeated complaints of failure by the armed forces. As part of the Make in India drive and push for the private sector in defence manufacturing, the Pinaka technology was transferred five years ago, with a decision taken to split further orders evenly with OFB. The army has a large requirement for rockets of this class, which is pegged at over 1,000 units annually. The Pinaka is a home developed multi barrel rocket launcher system that is already in service with the Indian Army. An order for two additional Pinaka regiments has been under process since 2017, which will be made by L&T and Tata Aerospace and Defence for an estimated Rs 4,500 cr.

The armed forces have been looking at creating alternate sources for munitions to reduce dependency on OFB that has had a mixed track record. Industry estimates peg that privately manufactured munitions of different variety would cost 20-30% cheaper than the OFB fixed pricing.

DRDO has also successfully tested an extended range guided Pinaka rocket that can hit targets at a distance of 75 km, a significant boost from the current range of 40 km.

<https://economictimes.indiatimes.com/news/defence/first-rockets-produced-by-private-sector-successfully-test-fired/articleshow/77646051.cms>

100% made by private sector – India successfully test fires multi barrel Pinaka rockets

According to DRDO, Pinaka is an all-weather, indirect fire, free flight artillery rocket system with two pods containing 6 rockets each, capable of firing in salvo mode within 48 sec neutralizing the area of 700 x 500 m

India has successfully test-fired its first-ever, fully manufactured by the private sector rockets – Pinaka. The Pinaka rockets were tested at a firing range in Pokhran, Rajasthan on Wednesday.

According to *The Economic Times* sources, six Pinaka rockets were test-fired as part of the final developmental trials. They achieved the desired results by accurately hitting targets. Manufactured by Economic Explosives Ltd (EEL), it became the first rockets to be fully made by the private sector in India.

This was possible after the company signed a technology transfer agreement with the state-owned Defence Research and Development Organisation (DRDO).

According to DRDO, Pinaka is an all-weather, indirect fire, free flight artillery rocket system with two pods containing 6 rockets each, capable of firing in salvo mode within 48 sec neutralizing the area of 700 x 500 m.

“It provides a unique capability to accurately deliver a devastatingly lethal and responsive fire against a variety of area targets such as exposed enemy troops, armoured and soft skin vehicles, communication centres, air terminal complexes, fuel and ammunition dumps.

The Pinaka weapon system consists of Rocket, Multi Barrel Rocket launcher, Battery Command Post, Loader cum Replenishment Vehicle, Replenishment Vehicle and Digicora MET Radar.”

Earlier, ammunitions of this class have been imported or have been manufactured by the public sector. The successful testing of the Pinaka symbolises another major achievement of the ‘Make in India’ campaign.

As reported earlier by EurAsian Times, the Indian government made a historical decision, self-imposing an embargo on 101 defence impedimenta to create a safe environment for indigenous companies in an effort to realize the goal of “Aatm-Nirbhar Bharat” (Self Reliant India) in the defence sector. The Pinaka MBRL made it to the embargo list and are already in production.

The army’s requirement for rockets of this class is pegged at over 1,000 units annually. Usually, all the production of defence equipment is through Ordnance Factory Board (OFB). However, in this case, with the technology transfer by DRDO, further orders are evenly split between EEL and OFB.

An order for two additional Pinaka regiments has been under process since 2017, which will be made by L&T and Tata Aerospace and Defence for an estimated Rs 4,500 crores. Experts have estimated that privately manufactured munitions of different variety would cost 20-30% cheaper than the OFB fixed pricing.

<https://eurasianimes.com/100-made-by-private-sector-india-successfully-test-fires-multi-barrel-pinaka-rockets/>



Pinaka multi-barrel rocket launcher – Wikipedia

Thu, 20 Aug 2020

NAG Missile carrier NAMICA-2 to dramatically boost Indian Army's firepower against China

By Ayush Jain

While India's relations with China and its western neighbor Pakistan are getting complicated, Indian defense minister Rajnath Singh launched 15 products developed by DPSUs (Defence Public Sector Undertakings) on the latter's Independence Day on 14th August.

Among the products launched were three out-of-the-box designs which were a topic of discussion among defense circles, namely the NAMICA, Vidhwansak Rifle, and the OFB Sniper Rifle chambered in .338 Lapua.

While the other two are small arms and have been in development/production for a long time, the showstopper was the new prototype of NAMICA – short for 'Nag Missile Carrier'.

The Nag Missile

As its name suggests, the NAMICA (Nag Missile Carrier) is a tracked, amphibious, armored 'missile-carrier' vehicle based on the BMP chassis. The new prototype was developed by the Ordnance Factory Medak in conjunction with DRDL, Hyderabad, and has an import substitution of Rs. 260 cr. In the first phase, and expected to rise up to Rs.3000 Cr.

First revealed in 2008, the Nag Missile and its Carrier share parallel development processes.

The earlier versions of the Nag missile had the uncooled LWIR sensors which failed to correctly identify their targets' heat signature during testing in the hot desert conditions of Rajasthan. According to sources, only one of the four missiles fired during trials in July 2012 had hit the target.

However, the development of the Nag missile had been fast-tracked owing to its importance in a number of projects – the Helicopter-launched variant Dhruvastra to arm Rudra and LCH – Light Combat Aircraft, the ground-based MPATGM, and SANT missile systems, and of course, the NAMICA.

This led to the development of a better seeker with higher resolution- the addition of a new focal panel array which enables the missile to get a clearer picture of the target and the surroundings, aiding in its differentiation from the background.

Missiles were further upgraded by incorporating IR-CCD processor chips supplied by France's ULIS-SOFRADIR. The trials of the missile from 2016 to 2020 have since been all successful – against both stationary and moving targets. The Indian army has repeatedly declared its plans for induction.

According to unclassified specifications, the Nag ATGM has a flight speed of 230 meters per second, is armed with an 8kg tandem shaped-charge warhead, has a rocket motor using nitramine-based smokeless extruded double base sustainer propellant, has a single-shot hit probability of 0.77, and a CEP of 0.9 meters, and has a 10-year maintenance-free shelf-life.

As of early 2020, the NAMICA remains the sole platform in which the missile is fully integrated while integration and testing of other platforms and variants are still in development.

NAMICA

Undaunted by the failures of the early NAMICA prototypes, the Defense Research & Development Organization (DRDO) went on to produce the improvised version of the platform called the NAMICA-2, housing not one but two CoMPASS Electro-Optical sighting systems – one for the gunner and one for the commander, giving it the "hunter-killer" capability.

The new addition, the CoMPASS Electro-Optical sensor is developed by the Israeli firm Elbit Systems and manufactured in India by BEL.

This sensor is also used in HAL Rudra and the Light Combat Helicopter and has been put on “hundreds of platforms” including UAVs, Helicopters, and other fixed-wing platforms providing excellent day and night intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) capabilities and has proven itself in the battlefields of Afghanistan and the Middle East.

The main visible change from the early version to the NAMICA-2 was the reduction of missiles carried from eight to six, along with an additional six in reserve totaling to twelve missiles carried.

Additionally, the NAMICA-2 is also given an Auxiliary Power Unit, which serves as an alternate source of power for the vehicle’s new and improvised fire control system.

This enables the vehicle to switch off the engine to reduce the infrared signature while being completely capable of firing the missiles, helpful in defensive and training roles.

The vehicle is also equipped with the NBC protection suite, protecting its crew from Nuclear, Biological, and Chemical threats in case such a situation arises. The vehicle is also installed with an automatic fire detection and suppression system and also features a remotely-controlled 7.62mm PKT machine gun.

The turret which houses six Nag missile launcher tubes provides 360-degree fire coverage and has an elevation capability of 0 to 24 degrees. It is also equipped with an advanced land navigation system, helping the commander with better situational awareness on the battlefield.

Based on the Russian-designed BMP chassis, the NAMICA-2 is amphibious, which can drive up to a maximum speed of 64 km/hour on flat terrain and 7 km/hr in water, making it immune to water obstacles like rivers or lakes, which gives it an additional capability to travel across first establishing a defensive perimeter with other BMPs of mechanized forces while engineers build the bridges to carry the tanks forward.

The NAMICA is indeed an important power booster for the Indian Army and a very essential addition for its mechanized and armored formations. The vehicle can be an effective deterrence against its enemies, being lighter at just about 15 tonnes, extremely maneuverable, and capable of destroying targets at ranges more than 4 kilometers.

<https://eurasianimes.com/nag-missile-carrier-namica-2-to-dramatically-boost-indian-armys-firepower-against-china/>

ThePrint

Thu, 20 Aug 2020

As Tejas begins flying near Pakistan border, IAF & HAL join hands to boost LCA availability

About half-a-dozen Tejas aircraft are doing stunts at various bases in the western sector, including at two locations that will host Tejas Mk 1A squadrons in the future

By Snehash Alex Philip

New Delhi: The Indian Air Force (IAF) and the state-run Hindustan Aeronautics Limited (HAL) are working together to ensure a high “availability ratio” for the indigenous Light Combat Aircraft (LCA) Tejas, which is doing flying stunts nears the border with Pakistan.

Availability ratio is the average number of aircraft that are available for flying at any point in time, taking into account servicing and spare parts issues.

In view of the Chinese aggression in Ladakh, the IAF has deployed its assets all along the borders with both China and Pakistan — which are allies to each other — since India is preparing for a possible collusive threat from them.

Accordingly, about half-a-dozen Tejas aircraft, all of the Initial Operational Clearance (IOC) standard, have been doing stunts at various bases in the western sector, including at two locations that will host Tejas Mk 1A squadrons in the future.

However, these stunts of the aircraft, which are otherwise based in Sullur, Tamil Nadu, are more for training purpose, although sources said they can be deployed for operations if the need arises.

“Technically, they have been operationally deployed amid rising tensions with China in Ladakh, but the flying is primarily for pilots to get used to border dynamics,” said a source, adding that the aircraft have been doing the stunts since June.

Even though the aircraft are IOC variants, the sources added, “they do carry limited air-to-air missile and bombing capabilities”.

The initial lot of Tejas, they said, is meant more for close-in protection of India’s own bases rather than actual combat in enemy territory.



Tejas Fighter jet | Twitter | @DRDO_India

First deployed operationally after Balakot strike

The first time the Tejas went in for “operational deployment” was after the Balakot strikes against a Jaish-e-Mohammed training camp in Pakistan last year.

At the time, the IAF had deployed nine Tejas aircraft at the Jaisalmer base but had to eventually make do with two because of low availability, sources said.

“Out of the nine aircraft, only two were available the last time,” a source added.

Both HAL and IAF are working together to ensure higher availability, the sources said.

The IAF is currently in the process of inducting Final Operational Clearance (FOC) aircraft, which are more advanced than the IOC ones. “FOC aircraft imbibe a lot of manufacturing improvements, which were based on the operational feedback of LCA IOC fleet with IAF,” the HAL had said in March this year.

Besides their capability to carry weapons, including Beyond Visual Range (BVR) ones, another major difference between IOC and FOC variants is fuel capacity.

The IOC Tejas currently carries two fixed tanks of 1,200- and 800-litre capacity. The FOC variants, meanwhile, not only get larger tanks but also mid-air refuelling capability.

The IAF is expected to finalise the deal for 83 Mark1A aircraft by the end of this year.

<https://theprint.in/defence/as-tejas-begins-flying-near-pakistan-border-iaf-hal-join-hands-to-boost-lca-availability/485159/>

नवभारत टाइम्स

Fri, 21 Aug 2020

भारतीय सेना को जल्द मिलेगी स्वदेशी

Bharat 52 गन, कुछ सेकंडों में ही गोलियों की बौछार

Indian Army Bharat 52 भारतीय सेना कथित तौर पर लगभग 150 ATAGS की खरीद करना चाहती है। कल्याणी ने कहा कि ऐड-ऑन और प्रौद्योगिकी के स्तर के आधार पर प्रत्येक एटीएजीएस की कीमत 15 करोड़ रुपये तक हो सकती है।

By Vineet Tripathi

नई दिल्ली: करगिल की लड़ाई में फतह दिलाने में अहम भूमिका निभानी वाली बोफोर्स तोप से भी पावरफुल तोप का निर्माण अब भारत में ही कर लिया गया है। रक्षा मंत्रालय ने ने बोफोर्स 155 एमएम होवित्जर्स तोप (Boforce 155 MM Howitzer) (artillery gun (155mm x 52 Calibre) बनाने का काम बाबा कल्याणी की कंपनी भारत फोर्ज (Bharat Forge) को दिया। इस गन को भारत 52 (Bharat 52) का नाम दिया गया है। भारत फोर्ज ने बताया कि चार गन में से तीन गन का ट्रायल अलग-अलग फेज में है और चौथे का ट्रायल अंतिम फेज में है। जल्द ही ये सेना का हिस्सा होंगी। यह कल्याणी समूह द्वारा निर्मित पहली बंदूक है।

भारत फोर्ज कंपनी ने बनाई

भारत फोर्ज के उप प्रबंध निदेशक अमित कल्याणी ने कहा, 'हम पहली बंदूक के लिए तीन परीक्षणों और दूसरी बंदूक के तीन परीक्षणों के दौर से गुजरे हैं। एक बार परीक्षण का अंतिम चरण समाप्त होने के बाद हम बिक्री प्रक्रिया शुरू करने के लिए तैयार हैं।' भारत फोर्ज रक्षा मंत्रालय द्वारा शुरू की गई सुधार पहल से का हिस्सा है। कुछ दिनों पहले ही रक्षा मंत्री राजनाथ सिंह ने 101 हथियारों और सैन्य प्लेटफार्मों के आयात पर प्रतिबंध लगाए गए हैं। इन 101 उत्पादों में आर्टिलरी गन भी शामिल है।



आर्टिलरी गन (155 मिमी x 52 कैलिबर)

आर्टिलरी गन (155 मिमी x 52 कैलिबर) जिसको हम लोग भारत 52 कहते हैं इसका वजन 15 टन है और 48 किमी से अधिक की फायरिंग रेंज है। इस गन की ताकत का अंदाजा आप यहीं से लगा लीजिए कि यह 30 सेकंड में छह राउंड फायर कर सकता है। ATAGS को दुनिया में सबसे उन्नत फील्ड आर्टिलरी सिस्टम में से एक माना जाता है, लेकिन भारत अभी तक उन्हें शामिल नहीं कर पाया है। 2016 में भारत ने अमेरिका से 145 होवित्जर (एक तोपखाने की बंदूक) 750 मिलियन डॉलर में मंगवाई। 155 मिमी x 39 कैलिबर के अल्ट्रा-लाइट हॉवित्जर की सीमा 24-39 किमी है, जो कि भारत 52 एटीएएस से काफी कम है।

तीन आर्टिलरी गन परीक्षण के उन्नत चरणों में

Bharat 52 के भारत उप निदेशक कल्याणी ने बताया, 'हम जो भी उत्पाद बना रहे हैं वो 100 प्रतिशत स्वदेशी हैं। वे 100 प्रतिशत यहीं डिज़ाइन किए गए। तीन आर्टिलरी गन परीक्षण के उन्नत चरणों में हैं। एक परीक्षण के अंतिम चरण में है। यह सभी तरह के परीक्षणों से गुजरी है। अब जो परीक्षण किया जा रहा है वो आखिरी परीक्षण है।

भारतीय सेना खरीदना चाहती है

भारतीय सेना कथित तौर पर लगभग 150 ATAGS की खरीद करना चाहती है। कल्याणी ने कहा कि ऐड-ऑन और प्रौद्योगिकी के स्तर के आधार पर प्रत्येक एटीएजीएस की कीमत 15 करोड़ रुपये तक हो सकती है। उन्होंने कहा, 'जिन उत्पादों पर हमने ध्यान केंद्रित किया है, वे सभी घरेलू विनिर्माण के लिए हैं। आर्टिलरी गन जैसे कुछ उत्पादों में यह बहुत स्पष्ट है कि तकनीक में या समग्र रूप से हमारे जैसा प्रतिस्पर्धी कोई नहीं है, इसलिए हम अपने अंतिम परीक्षणों के समापन की प्रतीक्षा कर रहे हैं।

भारत नहीं रहा आक्रामक

कल्याणी ने कहा, 'भारत फोर्ज अपने सैन्य हथियारों के लिए भारत के बाहर के बाजारों की भी तलाश कर रहा है। लेकिन, सवारियों के साथ, 'भारत जैसे जिम्मेदार राष्ट्र के लिए रक्षा आइटम बेचना आसान है। अब, ऐसे कई देश हैं जो हथियार खरीदते हैं जहां हमें नहीं पता कि वे इसके साथ क्या करते हैं। भारत कभी भी कहीं भी आक्रामक नहीं रहा है, इसलिए मैं उन जगहों पर बेचना चाहता हूं जहां इसे बेचना सुरक्षित है और जहां इसे बेचना उचित है।'

<https://navbharattimes.indiatimes.com/india/indian-army-bharat-52-gun-made-in-india-by-bharat-forge/articleshow/77660482.cms>

THEWEEK

Fri, 21 Aug 2020

Boeing testing Super Hornet fighter from 'ski-jump' for Indian Navy deal

Boeing is offering the Indian Navy the latest version of the Super Hornet

American aerospace giant Boeing is regarded as one of the frontrunners for a contract to supply the Indian Navy 57 fighters jets for operations off aircraft carriers.

Boeing responded to an Indian Navy request for information by offering its F/A-18 E/F Super Hornet fighter for the contract in 2017. The contract was then estimated to be worth at least \$6.6 billion.

Boeing is offering the Indian Navy the latest version of the Super Hornet, called the Super Hornet Block 3. The Super Hornet Block 3 features advances in electronics, display systems and increased fuel capacity. The Super Hornet Block 3 is also on offer to the Indian Air Force.

On Tuesday, Boeing confirmed that it was conducting tests for launching the Super Hornet off 'ski-jumps' at a US Navy base at Patuxent River in Maryland.

The US Navy uses catapults to launch aircraft, such as the Super Hornet, from its aircraft carriers. A catapult imparts additional momentum to the aircraft, enabling it to take off with maximum weight from a carrier, which has less runway length than an airfield.



A collage showing a Super Hornet in Indian Navy colours on the bottom (Boeing) and a Tejas fighter taking off from a ski-jump (Indian Navy)

But catapult have high-power generation requirements that are typically not available on non-nuclear-powered aircraft carriers, such as those the Indian Navy will use for foreseeable future.

The Indian Navy's existing aircraft carrier, the INS Vikramaditya, and the under-construction Vikrant, have ski-jumps. A ski-jump is a curved ramp at the end of a runway that force an aircraft upwards without it reaching maximum speed. The website of the US F-35 stealth fighter explains a ski-jump as simultaneously launching "aircraft upward and forward, enabling take-offs with more weight and less end-speed than required for an unassisted horizontal launch".

While ski-jumps allow an aircraft to take off with increased weight and give a greater safety margin, the total take-off weight of the aircraft would still be lower than that provided by using catapult-assisted launch.

Boeing released the statement on the ski-jump tests for the Super Hornet to US defence website *The Drive*.

"Boeing and the U.S. Navy are in the beginning phases of operating an F/A-18 Super Hornet from a ski jump at Naval Air Station Patuxent River to demonstrate it is STOBAR (short take-off but arrested recovery) compliant for the Indian Navy. Boeing completed extensive analysis and more than 150 flight simulations on F/A-18 compatibility with Indian aircraft carriers, and while our assessment has shown the Block III Super Hornet is very capable of launching off a ski jump, this is the next step in demonstrating that capability. More details will be released upon the conclusion of the test demonstration," Justin Gibson, a Boeing spokesperson, told *The Drive*.

An Indian journalist, Saurabh Joshi, had earlier tweeted about the ski-jump tests.

Boeing had indicated in February that it would commence ski-jump tests for the Super Hornet this year. In fact, Boeing has touted ski-jump compatibility for the Super Hornet to attract the Indian Navy as far back as 2008. In 2008, a Boeing official told *Hindustan Times* about simulations of ski-jump launches.

"“In our simulation, we discovered that not only could the Super Hornet take-off from a ski-jump, but could do so with a significant weapons load," the official told *Hindustan Times*.

Boeing's confirmation of ski-jump tests is significant as it is considered one of two frontrunners for the Indian Navy contract, the other being the naval version of the Dassault Rafale. In 2018, *Economic Times* reported Dassault had provided data of simulation of ski-jump launches of the Rafale to the Indian Navy. "... extensive tests and software analysis have been conducted by the French side on the Rafale to show that it can operate with a meaningful load from ski-jump carriers," *Economic Times* reported.

<https://www.theweek.in/news/india/2020/08/20/boeing-testing-super-hornet-fighter-from-ski-jump-for-indian-navy-deal.html>

Seven active Chinese military air bases under close watch of Indian agencies

The Chinese PLAAF has upgraded a number of these bases in recent times including the construction of hardened shelters, the extension of runway lengths and deployment of additional manpower to carry out more operations, they said

New Delhi: Even as the tensions on China border continue over territorial issues, Indian agencies are keeping a close eye on the activities of the People's Liberation Army's Air Force (PLAAF) spread all along the Line of Actual Control with India opposite Ladakh in the north to Arunachal Pradesh in the Northeast.

"We are keeping a close watch on the Hotan, Gar Gansa, Kashghar, Hopping, Dkonka Dzong, Linzhi and Pangat airbases of the PLAAF in the Xinjiang and Tibet region and all of them have been highly active in the recent times," government sources told ANI.

The Chinese PLAAF has upgraded a number of these bases in recent times including the construction of hardened shelters, the extension of runway lengths and deployment of additional manpower to carry out more operations, they said.

Sources said the Linzhi airbase opposite the Northeastern states is mainly a helicopter base and the Chinese have also built a network of helipads there to enhance their surveillance activities in those areas.

The PLAAF has been deploying their fighter aircraft including their Chinese version of the Sukhoi-30 and indigenous J-series fighters opposite the Ladakh sector and other areas along with their strategic bombers which have been under constant monitoring of the Indian agencies through satellites and other means.

The Indian side has also ramped up its preparedness in the view of the heightened activity by the Chinese forces on their side of the LAC and has deployed its fleet of Sukhoi-30MKIs, MiG-29s and Mirage-2000s at the forward air bases to tackle any misadventure.

In the initial phase of the tension with China in the April-May timeframe, the Indian forces had seen the deployment of Su-30s and MiG-29s in the forward air bases and they had played an important role in thwarting an airspace violation bid by the Chinese aircraft in the Eastern Ladakh sector.

The Indian Air Force has an edge over the Chinese in the Ladakh region as their fighters have to fly and take off from very high altitude bases while the Indian fleet can take off from plains and reach the mountainous region in almost no time.

<https://www.hindustantimes.com/india-news/seven-active-chinese-military-air-bases-under-close-watch-of-indian-agencies/story-6Cpne426wMOyqfGBtuWaPK.html>



In this Sept. 14, 2017, file photo, a banner erected by the Indian army stands near Pangong Tso lake near the India China border in India's Ladakh area.(AP)

India's electronic warfare units are archaic, but camouflage, concealment can blunt PLA

India has been left two decades behind China with respect to military capability in general and information warfare in particular. Ladakh is a wake-up call

By Lt Gen H S Panag (Retd)

If the People's Liberation Army of China leads a technology-driven attack on the Indian forces in high altitude terrain, what are India's options? The PLA will rely more on Cyber and Electronic Warfare, and PGMs, rather than on an infantry-predominant close-combat attack from a position of disadvantage.

In the near future, cyber, electronic, space and artificial intelligence domains of warfare will be exploited, in addition to the traditional domains of land, air and sea. With full-scale wars between nuclear weapon States being a passé, these new domains will be the primary means of use of force in the competitive conflict among nations.



File image of Indian soldiers in Ladakh | Representational image | By special arrangement

An article by a US think tank visualises the future of war well. Published in February this year, the authors create a 'modern' battlefield of 2035, involving India on one side and China-Pakistan on the other in Jammu and Kashmir. But kinetic and electronic attacks by drone swarms are no longer a fantasy. Nearer home, there was a report in Pakistan media last week about cyberattacks targeting Army personnel and government officials. It has been speculated that the May 2017 Sukhoi 30 crash in Arunachal Pradesh was caused by a cyberattack from China.

India needs to catch-up

Our armed forces have been seized of the problem for the last two decades now, but not much has moved. In 2004, former Chief of Army Staff General S. Padmanabhan, soon after his retirement, wrote a fictional account *The writing on the wall-India checkmates America 2017* a scenario of an India-Pakistan war wherein US acts in collusion with Pakistan, but is neutralised by an Indian cyberattack. This optimism back then was due to a growing acknowledgement for India as a world leader in Information Technology. However, despite an early start, so far in real terms, we have only taken baby steps.

We have had Signal Intelligence and Electronic Warfare units for a long time. However, these are saddled with archaic equipment. Indigenisation has made no headway and import is extremely difficult due to reluctance of foreign governments. We created Information Warfare Brigades on the lines of what the US Army has, but failed to integrate Electronic Warfare, Cyber Warfare, psychological operations and military deception under them.

We have yet to evolve a formal doctrine on Information Warfare. Although the Indian Air Force (IAF) and the Indian Navy are in a much better position than the Army, they too are well short of the desired capability. During the dogfight the day after Balakot, questions were raised about the electronic warfare capability of our aircraft vis a vis the F16s. We have done well to establish the Defence Cyber Agency and Defence Space Agency in 2018, but these are only baby steps and we have miles to go. Recently, the Army ordered a study, headed by a senior Lt Gen on advanced "niche and disruptive warfare technologies" that range from drone swarms, robotics, lasers and loiter munitions to artificial intelligence, big data analysis and Algorithmic Warfare.

In sharp contrast, the PLA has a head start of three decades and has been seized with Information Warfare since 1993, post-Gulf War 1 in 1990. The PLA's strategic concept, which is

formally given out in the Central Military Commissions' Defence White Papers, in 1993, highlighted "local wars under modern conditions". In 2004, this was modified to – "winning local wars under conditions of informationisation (sic)". The strategic concept was further modified in 2015 to "winning informationised (sic) local wars". This strategy signifies that Information Warfare — encompassing Electronic Warfare, Cyber Warfare, Psychological Warfare, strategic deception and communication/electronics aspects of Space Warfare — will play a predominant role in the way China fights its wars. To this end, in the 2015 reforms, the PLA's Strategic Support Force has been created to control all sub-domains of Information Warfare.

The PLA is rapidly laying fibre-optic cables in areas secured through its preemptive manoeuvre in Eastern Ladakh, to enhance its Information Warfare capabilities.

How to defeat PLA's high-tech attack?

Given the huge differential in Information Warfare and PGM capabilities, our armed forces have to rely on innovation to defeat the PLA.

- Our present defences were designed to defeat suppressive fire of small arms and non- PGM artillery, and stand out like sore thumbs. They are no different from what we had prepared a 100 years ago and will be obliterated by stand-off ground or air-delivered penetrator PGMs. We need to create concretised tunnel-based defences. South Korea's defences along the 38th parallel are an excellent example.
- Rather than concentrating on the defences near the top of the heights, we should disperse them along the slopes to present smaller targets. Camouflage and concealment should be used extensively to deny information and mockups must be created to present false targets.
- The enemy wants to avoid close combat. Hence, it would be prudent to force him to engage in close combat. This can be done by organising the defences in depth to force the PLA to fight a successive battle. Once initial contact is established, the enemy can't use PGMs or area weapons due to his own safety. Launch "spoiling attacks", which implies attacking the enemy as he moves forward from his assembly areas, to form up for the attack. Launch immediate counter-attacks when the enemy commences mopping-up.
- Make concentrated use of own information warfare resources to attack the enemy command, control and weapon systems.
- Target enemy information warfare resources and PGM weapon platforms with counter-PGM attacks.
- Rather than passively waiting for a high-tech enemy attack to commence, go on an offensive. This can be done both at the higher level with operational level reserve and at the tactical level all along the LAC.
- Coordinate with the US, Israel and France to make emergent procurement of state-of-the-art information warfare equipment.

We have been left at least two decades behind China with respect to military capability in general and Information Warfare in particular. With respect to the latter, the government must set up a task force with active participation of our Information Technology companies and IITs to catch up with China. Eastern Ladakh is a wake-up call. We must reform to bridge this asymmetry or we will bumble along from crisis to crisis, fraught with apprehensions and uncertainty about the outcome.

(Lt Gen H S Panag PVSM, AVSM (R) served in the Indian Army for 40 years. He was GOC in C Northern Command and Central Command. Post retirement, he was Member of Armed Forces Tribunal. Views are personal.)

<https://theprint.in/opinion/indias-electronic-warfare-units-are-archaic-but-camouflage-concealment-can-blunt-pla/485152/>

China increases surveillance on Indian Army's central sector amid border tension along LAC: Intelligence report

Amid its border tension with India, China has increased its surveillance on the central sector of the Indian Army, according to intelligence report on Thursday

Written By Krishna Mohan Mishra and Edited By Ananya Das

Highlights

- ***In a bid to monitor the movement of the Indian Army, China has upgraded its surveillance system as it realised that the strength of India shouldn't be underestimated.***
- ***Amid its border tension with India, China has increased its surveillance on the central sector of the Indian Army, according to intelligence report on Thursday.***
- ***The border tension between India and China escalated on June 15 when 20 Indian Army personnel were martyred after violent clashes with Chinese troops along the LAC.***

In a bid to monitor the movement of the Indian Army, China has upgraded its surveillance system as it realised, after the violent clashes along the Line of Actual Control (LAC) in Galwan Valley of eastern Ladakh, that the strength of India shouldn't be underestimated. Amid its border tension with India, China has increased its surveillance on the central sector of the Indian Army, according to intelligence report on Thursday.

The border tension between India and China escalated on June 15 when 20 Indian Army personnel were martyred after violent clashes with Chinese troops along the Line of Actual Control (LAC) in Galwan Valley of eastern Ladakh.

China has upgraded its surveillance system on the other side of Tun-Jun-La near Barahoti in Uttarakhand's Chamoli district. India's border is till Tun-jun-la, three kilometres ahead of Barahoti. During the current tensions between India and China, China upgraded its surveillance devices across the LAC.

According to the report, China has installed two cameras rotating up to 180 degrees near the LAC. It has also installed several kinds of poles in that area. China has also built a large solar panel and a windmill in the area.

A small hut has been built in the area where different types of construction materials have also been kept, including surveillance. A surveillance system was installed in Tun Jun La (Barahoti) in September 2019 which was upgraded in June. This system and camera have been positioned in such a way that the PLA of China can keep an eye on the entire area of Barahoti.

Meanwhile, India is working on making a new road from Manali to Leh, which will provide the third link between the high altitude mountainous Union Territory (UT) and the rest of the country, in an effort to rush troops and tanks to the Pakistan and China front in Ladakh without being observed by the enemy, according to news agency PTI.

India is also working on providing alternative connectivity to the strategically important Sub-Sector North including the Daulat Beg Oldi and other areas there for the last three years and work has already started from the world's highest motorable road Khardung La pass.

"Agencies are working to provide alternative connectivity from Manali to Leh through Nimu-Padam-Darcha axis which will help in saving a lot of time in comparison with the existing routes passing through Zojila pass from Srinagar and the other route from Manali to Leh through Sarchu," government sources told PTI.

The road will save almost three to four hours journey time while travelling from Manali to Leh and will also not leave any scope for the Pakistanis or other adversaries to monitor the movement

of the Indian Army while deploying troops and heavy weaponry like tanks and artillery guns to the Ladakh area from other locations, they said.

The route mainly used for transportation of goods and men is the one from Zojila, which passes through Drass-Kargil axis to Leh. The same route was targeted heavily by the Pakistanis during the Kargil war in 1999 and was subjected to frequent bombarding and shelling by their troops from positions in high altitude mountains alongside the road.

Sources said the work has already started on this project and the new road will connect Manali with Leh near Nimu where Prime Minister Narendra Modi had recently visited during the ongoing conflict with China.

Likewise, to provide alternatives to the strategic Durbuk-Shyok-Daulat Beg Oldi road, India is working on further developing the old summer route on which caravans used to reach eastern Ladakh areas from the western side.

The new road will travel from Leh towards Khardungla and then move through glaciers including the Sasoma-Saser La-Shyok and Daulat Beg Oldi axis.

Senior sources said that the 14 Corps was given the responsibility of finding an alternative to the DSDBO road and check the road coming from near the Siachen camp towards the DBO area, and one unit was sent through there on a trial basis.

The Army unit travelled from Sasoma to Saser La in vehicles and the rest of the area on foot, on the route which is full of bones of double-humped camels which were used to ferry cargo, through the very rough Shyok river during the summers. The new route was earlier used by the Army also to maintain the Sub Sector North.

<https://zeenews.india.com/world/china-increases-surveillance-on-indian-armys-central-sector-amid-border-tension-along-lac-intelligence-report-2304118.html>

Space activities bill submitted to PMO, Cabinet nod soon; ISRO is not being privatised: Sivan

By Surendra Singh

New Delhi: Giving a push to a long-pending dedicated space legislation, Indian Space Research Organisation (Isro) announced on Thursday that the Space Activities Bill is in final stages and is expected to get the Cabinet's nod soon. The bill defines space activities, associated risks and liabilities, and defines regulatory norms.

"The bill has been submitted to the PMO and we hope inter-ministerial consultations on the bill will be carried out and the Cabinet will clear it soon for its introduction in Parliament," said R Uma Maheshwaran, scientific secretary (Isro), during a webinar on "Unlocking of India's Potential in Space Sector".

The webinar was attended by Isro chairman K Sivan, principal secretary adviser K VijayRaghavan, Bharati Enterprises chairperson Sunil Bharti Mittal and Mahindra Group head Anand Mahindra among other dignitaries.

Uma Maheshwaran also said that following the recent Cabinet announcement on the opening up the space sector for the private industry, SATCOM policy and remote sensing policy are being revised in sync with the policy changes and a new navigation policy is being formulated.

Explaining the probable activities where the private sector can participate, the scientific secretary said that private companies can build launch vehicles, provide launch services, build and launch satellites, own satellites and operate them and can provide space-based services.

Setting at rest a misconception that Isro is being privatised, space agency chairman K Sivan said: "Some reports say new policy changes will allow privatisation of Isro. I am again and again saying Isro is not being privatised. Isro's activities are instead going up and it's building up its capacity building and developmental activities. It will facilitate the private sector participation in space activities through announcement of opportunities. But the private sector will have to do its own R&D. Isro will only provide technical knowhow and its expertise."

Sivan also said Isro welcomed the Modi government's decision to ban the import of communication satellites in order to promote "Atmannirbhar Bharat" or self-reliant India.

The move will throw up huge opportunity for private players in the country. Anand Mahindra said the public-private-partnership (PPP) model is the way to go while unlocking potential in the space sector. He said cost efficiency, high-end engineering skill and frugal engineering will propel Indian space sector. Mahindra urged the government to think and create structures and systems that were not there earlier.

With this initiative of unlocking the space sector, India is definitely going to become space-fairing nation and will benefit immensely as "space will be the gold rush of the future".

Industrialist Sunil Bharti Mittal sought's Isro's partnership in building user terminals that will enable take internet to rural India. Bharti Enterprises recently bought OneWeb jointly with the UK government. Recalling his meeting with UK PM Boris Johnson, Mittal said India's achievements in the space sector are being talked about globally.

"I remember PM Johnson saying that 'India was a first rate power in space and that it was the UK's ambition to catch up with the prowess that India possesses' that made me proud."

The Bharti chairman also said that unambiguous policies are needed to facilitate the private sector's participation in the space sector which should also protect the security and strategic interests of the country.

<https://timesofindia.indiatimes.com/india/space-activities-bill-submitted-to-pmo-cabinet-nod-soon-isro-is-not-being-privatised-sivan/articleshow/77654262.cms>

ThePrint

Fri, 21 Aug 2020

This is how govt plans to bring together ISRO, private players to boost India's space sector

ISRO Thursday announced more details about IN-SPACE and the specific roles opening up for the private industry to increase public-private partnership

By Sandhya Ramesh

Bengaluru: Under the Modi government's vision of increased public-private partnership, private companies are expected to contribute to building launch vehicles and providing launch services, building satellites and providing satellite services, and providing "space-based services", said India's premier space agency Thursday.

At a webinar titled 'Unlocking India's Potential in Space Sector', scientific secretary of Indian Space Research Organisation (ISRO), R. Umamaheswaran outlined the new proposed structure of this partnership, explaining the roles of different agencies and organisations involved, as well as policy updates required.

The bridging agency between the two sectors will be Indian National Space Promotion and Authorisation Centre (IN-SPACE), an autonomous, national-level nodal agency.

ISRO Chairman Dr. K Sivan, Principal Scientific Adviser to the govt Dr K. VijayRaghavan and members from private industry and academia were also part of the webinar.

New partnership, new roles

The guiding principles for involving the private sector will be based on the Space Activity Bill, satcom (satellite communications) policy, remote sensing policy and navigation policy, among others.

The Department of Space (DoS) will help private players through the process and also aid in the creation IN-SPACE, which will be responsible for permitting and monitoring private sector space activities, licensing players, regulating said activities and facilitating use of ISRO facilities.

The nodal agency will also help promote industries, build launch vehicles and satellites, establish other facilities like launch pads inside DoS premises, monitor space-based services, and also provide supportive help to private players.

Further, it will be responsible for drawing up an Integrated Launch Manifest, which will set clear boundaries between the private sector, ISRO and one of ISRO's commercial wings, the NewSpace India Limited (NSIL). It will have to also prevent conflict of interest between the bodies. Telecom Disputes Settlement and Appellate Tribunal (TDSAT) will work as an appellate body for conflict resolution.

ISRO said the process will get started with the enactment of the Space Activity Bill, a legislation that has come under repeated criticism by many in the private industry for not prioritising industry needs.

Also, the NSIL has been updated with new strategic mandates as IN-SPACE takes hold. Instead of being responsible for PSLV/SSLV launch vehicle production, providing launch services for customers and space services, NSIL's role has been updated to owning and providing space services, building and launching satellites and launch vehicles through the Indian industry.

IN-SPACE set up

The nodal agency will have a board comprising members from the industry, academia, DoS and IN-SPACE itself, which will be chaired by a secretary-level officer who is fully empowered to take independent decisions.

IN-SPACE will have four directorates to run operations — technical, safety & security, legal and promotion & monitoring.

The technical directorate will be responsible for documentation, standards, and technical reviews. The safety and security directorate will oversee strategic interest, foreign policy and safety. The legal directorate will monitor compliance with the Space Activity Bill and other policies or regulations. The promotion and monitoring directorate will check for compliance to reliability and quality, while also working with private players by guiding them and promoting their activities.

Application process

To streamline and make user-friendly the process of private player application to IN-SPACE, ISRO stated that it has launched an online portal where applicants can submit their requests. These will then be looked at by the technical, legal, and the safety & security directorates, which will evaluate the applications and also list the kind of support and facilities needed. The approved applications will then be passed on to the IN-SPACE board for evaluation, permissions, support and follow through.

But these changes might not be sufficient to streamline the process, say some experts.

“What is still missing is the representation of critical departments like DoT, DoD, MHA, etc, that will have a say in space activities,” said Narayan Prasad, COO of satsearch.co, a global marketplace for space-technology products.

“Time capping all processes is another critical issue. IN-SPACE would also need to work on architecting new schemes to enable R&D investment by ISRO and change in procurement rules to ease procurement from startups.

<https://theprint.in/india/governance/this-is-how-govt-plans-to-bring-together-isro-private-players-to-boost-indias-space-sector/486001/>

THE TIMES OF INDIA

Fri, 21 Aug 2020

Chandrayaan-2 completes a year around Moon, adequate fuel for 7 more years: ISRO

Bengaluru: India's second lunar mission Chandrayaan-2 completed one year in orbit around the moon on Thursday and all instruments are currently performing well and there is adequate onboard fuel to keep it operational for about seven more years, space agency ISRO said.

Chandrayaan-2 was launched on July 22, 2019 and inserted into the lunar orbit on August 20, exactly one year ago.

"Though the soft-landing attempt (of the lander carrying the rover) was not successful, the orbiter, which was equipped with eight scientific instruments, was successfully placed in the lunar orbit. The orbiter completed more than 4,400 orbits around the Moon and all the instruments are currently performing well," the Indian Space Research Organisation said.

The agency in a statement said the spacecraft was healthy and the performance of subsystems normal.

"The orbiter is being maintained in 100 +/- 25 km polar orbit with periodic orbit maintenance (OM) maneuvers. So far, 17 OMs are carried out since achieving 100 km lunar orbit on 24th September 2019. There is adequate onboard fuel to remain operational for about seven years," it added.

Chandrayaan-2 mission was India's first attempt to make a softlanding of a rover on the uncharted South Pole of the lunar surface.

However, the lander Vikram hard-landed in September last year.

The scientific payloads, including high resolution camera, onboard the orbiter for mapping the lunar surface and study the exosphere (outer atmosphere) of the Moon.

The city-headquartered Isro said raw data from the payloads have been downloaded at the Indian Space Science Data Centre (ISSDC) during the year.

Public data release was planned by end of this year, after validation by a formal peer review, it said adding the first-year observations from Chandrayaan-2 demonstrate the in-orbit performance of payloads, strongly indicating its ability to contribute significantly to lunar science.

"The anticipated long life of this orbiter can contribute much to the current resurgence of interest among the global scientific community for a sustained presence on the Moon," the space agency said.

Chandrayaan-2 was launched to further expand the knowledge about the moon through a detailed study of its topography, mineralogy, surface chemical composition, thermo- physical characteristics and atmosphere, leading to a better understanding of the origin and evolution of the moon.

India's first mission to the Moon Chandrayaan-1, launched in 2008, had given clear evidence on the extensive presence of surface water and the indication for subsurface polar water- ice deposits.

<https://timesofindia.indiatimes.com/india/chandrayaan-2-completes-a-year-around-moon-adequate-fuel-for-7-more-years-isro/articleshow/77659064.cms>



Fri, 21 Aug 2020

A new kind of plastic that is able to maintain its original qualities when recycled

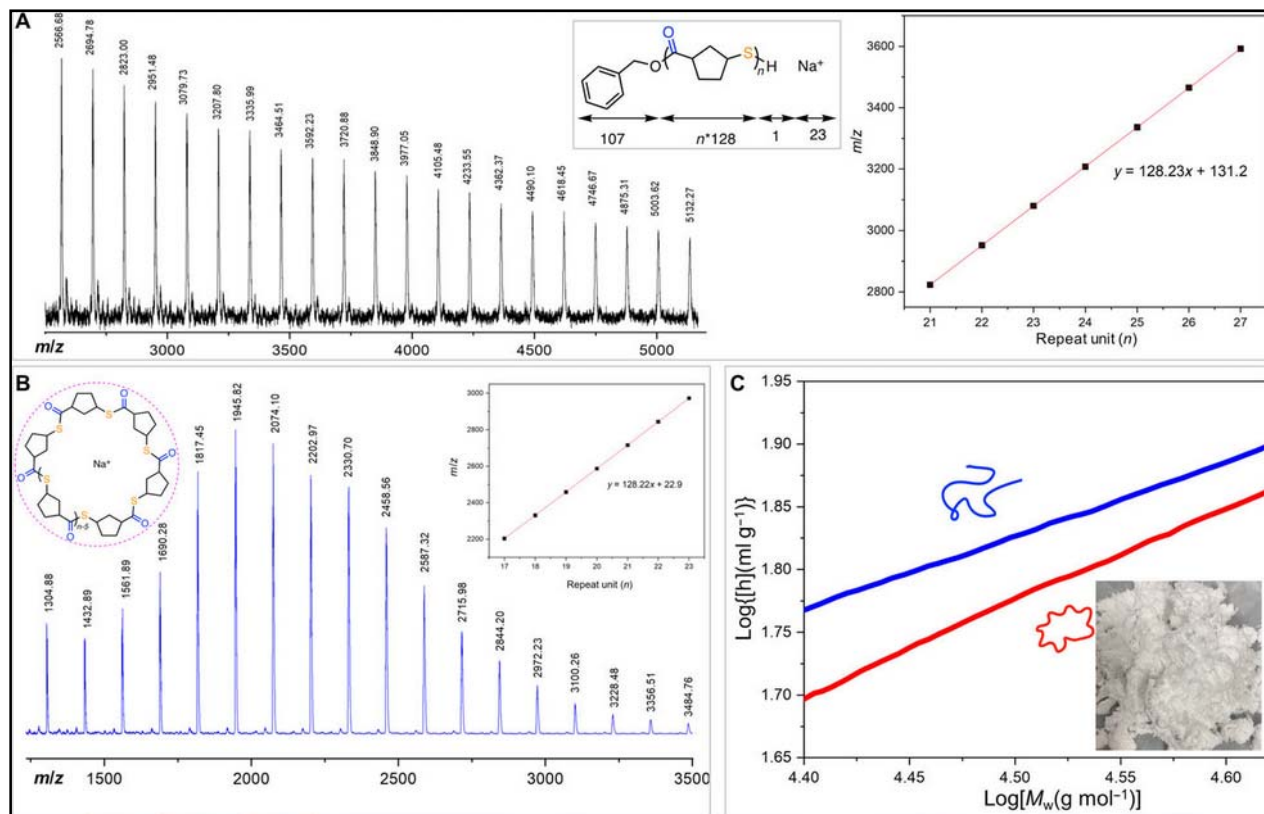
By Bob Yirka

A team of researchers from the U.S., China, and Saudi Arabia has developed a new kind of plastic that is able to maintain its original qualities when recycled. In their paper published in the journal *Science Advances*, the group describes how the new plastic is made and how well it did when tested for recyclability.

For many years, plastics have been seen as a highly desirable modern advancement—they are light, strong, bendable when needed, and can be used in a very wide variety of applications. The down side to plastics, of course, is that they do not recycle very well and they take a very long time to decay. This has led to millions of tons of plastic waste winding up in landfills and in the water table. Because of that, scientists have been hard at work looking for a new kind of plastic that has all the advantages of the old plastic but also can be easily recycled. In this new effort, the researchers claim to have developed just such a plastic.

The researchers made the new plastic by preparing a bridged bicyclic thiolactone monomer from a bio-based olefin carboxylic acid. The result was a plastic (they called PBTL) that had all the qualities of traditional plastics. They next tested their plastic by conducting bulk depolymerization at 100°C using a catalyst. Testing of the result showed the PBTL had been broken down into its original monomer. They followed that up by breaking down samples of PBTL (using a catalyst) at room temperature. And once again, close examination showed the sample had been broken down to the original monomer.

The team then used the monomers from both processes to make new batches of PBTL, proving that the new plastic could be created, broken down and created again—over and over. The researchers suggest that the process could be repeated indefinitely. They further suggest that their new plastic could be used to make a host of products now made using conventional plastics—greatly reducing the amount of plastics that end up in the environment. The only caveat in the scenario is that such plastics would have to be separated from other materials before they could be recycled.



Determination of topology by MALDI-TOF MS and viscosity. (A) MS spectrum and plot of mass/charge ratio (m/z) values versus the theoretical number of M repeat units for the linear PBTL produced by IMes and BnOH. (B) MS spectrum and plot of m/z values versus the theoretical number of M repeat units for the cyclic PBTL produced by IMes alone. (C) Double logarithm (Mark-Houwink) plots of intrinsic viscosity $[\eta]$ versus M_w of the linear (blue line) and cyclic (red line) PBTL samples produced by IMes with BnOH and without BnOH. Inset: a photograph of isolated cyclic PBTL. Credit: *Science Advances* (2020). DOI: 10.1126/sciadv.abc0495

More information: Changxia Shi et al. High-performance pan-tactic polythioesters with intrinsic crystallinity and chemical recyclability, *Science Advances* (2020). DOI: 10.1126/sciadv.abc0495

Journal information: [Science Advances](https://www.science.org)

<https://phys.org/news/2020-08-kind-plastic-qualities-recycled.html>

A quantum thermometer to measure the coldest temperatures in the universe

By Thomas Deane

Physicists from Trinity College Dublin have proposed a thermometer based on quantum entanglement that can accurately measure temperatures a billion times colder than those in outer space.

These ultra-cold temperatures arise in clouds of atoms, known as Fermi gasses, which are created by scientists to study how matter behaves in extreme quantum states.

The work was led by the QuSys team at Trinity with postdoctoral fellows, Dr. Mark Mitchison, Dr. Giacomo Guarnieri and Professor John Goold, in collaboration with Professor Steve Campbell (UCD) and Dr. Thomas Fogarty and Professor Thomas Busch working at OIST, Okinawa, Japan.



Credit: Pixabay/CC0 Public Domain

Their results have just been published as an Editor's Suggestion in the prestigious journal *Physical Review Letters*.

Discussing the proposal, Professor Goold, head of Trinity's QuSys group, explains what an ultra-cold gas is. He said:

"The standard way in which a physicist thinks about a gas is to use a theory known as statistical mechanics. This theory was invented by giants of physics such as Maxwell and Boltzmann in the 19th century. These guys revived an old idea from the Greek philosophers that macroscopic phenomena, such as pressure and temperature, could be understood in terms of the microscopic motion of atoms. We need to remember that at the time, the idea that matter was made of atoms was revolutionary."

He continued: "At the dawn of the 20th century, another theory came to fruition. This is quantum mechanics and it may be the most important and accurate theory we have in physics. A famous prediction of quantum mechanics is that single atoms acquire wave-like features, which means that below a critical temperature they can combine with other atoms into a single macroscopic wave with exotic properties. This prediction led to a century-long experimental quest to reach the critical temperature. Success was finally achieved in the 90s with the creation of the first ultra-cold gasses, cooled with lasers (Nobel Prize 1997) and trapped with strong magnetic fields—a feat which won the Nobel Prize in 2001."

He added: "Ultra-cold gasses like these are now routinely created in labs worldwide and they have many uses, ranging from testing fundamental physics theories to detecting gravitational waves. But their temperatures are mind-bogglingly low at nanokelvin and below! Just to give you an idea, one kelvin is -273.15 degrees Celsius. These gasses are a billion times colder than that—the coldest places in the universe and they are created right here on Earth."

So what exactly is a Fermi gas? He explains: "All particles in the universe, including atoms, come in one of two types called 'bosons' and 'fermions.'" A Fermi gas comprises fermions, named after the physicist Enrico Fermi. At very low temperatures, bosons and fermions behave completely differently. While bosons like to clump together, fermions do the opposite. They are the ultimate social distancers! This property actually makes their temperature tricky to measure."

Dr. Mark Mitchison, the first author of the paper, explains: "Traditionally, the temperature of an ultra-cold gas is inferred from its density: at lower temperatures the atoms do not have enough energy to spread far apart, making the gas denser. But fermions always keep far apart, even at ultra-low temperatures, so at some point the density of a Fermi gas tells you nothing about temperature. Instead, we proposed using a different kind of atom as a probe. Let's say that you have an ultra-cold gas made of lithium atoms. You now take a different atom, say potassium, and dunk it into the gas. Collisions with the surrounding atoms change the state of your potassium probe and this allows you to infer temperature. Technically speaking, our proposal involves creating a quantum superposition: a weird state where the probe atom simultaneously does and doesn't interact with the gas. We showed that this superposition changes over time in a way that is very sensitive to temperature."

Dr. Giacomo Guarnieri gives the following analogy: "A thermometer is just a system whose physical properties change with temperature in a predictable way. For example, you can take the temperature of your body by measuring the expansion of mercury in a glass tube. Our thermometer works in an analogous way, but instead of mercury we measure the state of single atoms that are entangled (or correlated) with a quantum gas."

Professor Steve Campbell, UCD, remarks: "This isn't just a far-flung idea—what we are proposing here can actually be implemented using technology available in modern atomic physics labs. That such fundamental physics can be tested is really amazing. Among the various emerging quantum technologies, quantum sensors like our thermometer are likely to make the most immediate impact, so it is a timely work and it was highlighted by the editors of *Physical Review Letters* for that reason."

Professor Goold adds: "In fact one of the reasons that this paper was highlighted was precisely because we performed calculations and numerical simulations with a particular focus on an experiment that was performed in Austria and published a few years ago in *Science*. Here the Fermi gas is a dilute gas of trapped Lithium atoms which were in contact with Potassium impurities. The experimentalists are able to control the quantum state with radio frequency pulses and measure out information on the gas. These are operations that are routinely used in other quantum technologies. The timescales that are accessible are simply amazing and would be unprecedented in traditional condensed matter physics experiments. We are excited that our idea to use these impurities as a quantum thermometer with exquisite precision could be implemented and tested with existing technology."

More information: Mark T. Mitchison et al. In Situ Thermometry of a Cold Fermi Gas via Dephasing Impurities, *Physical Review Letters* (2020). [DOI: 10.1103/PhysRevLett.125.080402](https://doi.org/10.1103/PhysRevLett.125.080402)

Journal information: [Physical Review Letters](https://phys.org/news/2020-08-quantum-thermometer-coldest-temperatures-universe.html)
<https://phys.org/news/2020-08-quantum-thermometer-coldest-temperatures-universe.html>

Some bacteria sacrifice themselves to protect their brethren from antibiotics

By Esther Robards-Forbes

Scientists at The University of Texas at Austin have discovered how some cells within a bacterial swarm will sacrifice themselves so that other cells in the swarm have a better chance of surviving onslaught by antibiotics, in a discovery important for efforts to address antibiotic resistance.

As bacterial cells within a cluster or swarm die, they release chemical death cries, which scientists call necrosignaling. These signals act like a kind of early warning system, allowing the surviving bacterial cells to prepare a type of resistance to antibiotics. The process of necrosignaling is outlined in a new paper out today in *Nature Communications*.

Bacterial swarms occur when certain types of bacteria, like *E. coli*, band together by the billions and use their whip-like flagella to move as one over a solid surface. Scientists have previously observed that these swarms are more resistant to antibiotics and knew that dead bacteria provide nutrients to surviving bacteria in the swarm. However, this is the first time an active signal has been uncovered.

Rasika Harshey, the Lorene Morrow Kelley Professor of Microbiology, and her team had observed almost a decade ago that when bacterial swarms moved into an area that was treated with antibiotics, about 25% of the cells in the swarm died. They wondered if this massive cell death was altruistic in actually helping the community as a whole survive. The results in the paper out today show that this is true. As they died, the cells released a protein that would bind to the surface of the surviving bacterial cells. This acted like a signal, letting survivors in the bacterial swarm know to start pumping the antibiotic out of the cells using specialized molecular machines called efflux pumps.

"While this resistance is physiological, it buys the bacteria time to acquire mutations that would eventually lead to genetic resistance," Harshey said.

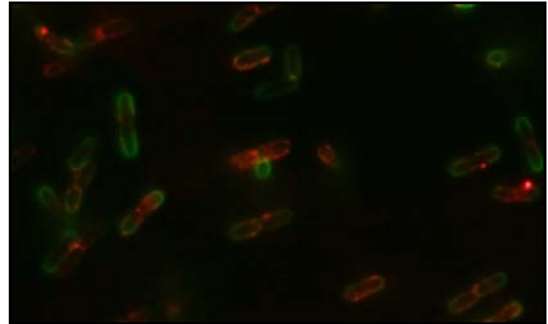
Antibiotic-resistant bacteria represent a critical problem in medicine because once a bacterium becomes resistant to several types of antibiotic medications, it becomes incredibly difficult to treat infections in humans and animals.

By understanding one of the mechanisms by which these hard-to-kill swarms survive contact with antibiotics, scientists may be able to target that process with therapeutic drugs.

"Interfering with necrosignaling should enhance the efficacy of antibiotics and reduce the occurrence of drug-resistant strains," Harshey said.

Harshey and her team discovered through their research that within the bacterial swarm, a subpopulation of cells appears to be more susceptible to antibiotics, like a kind of bacterial cannon fodder. By developing these different types of cells, the swarm has a better chance of survival than single bacterial cells.

"Many clinically important bacteria go through phases of their infection cycle outside the host in harsh environments where swarming would increase their chances of acquiring antibiotic resistance through necrosignaling," Harshey said. "With better understanding of this process we may be able to halt it."



Bacteria in the lab. Credit: University of Texas at Austin

More information: Souvik Bhattacharyya et al. Dead cells release a 'necrosignal' that activates antibiotic survival pathways in bacterial swarms, *Nature Communications* (2020). DOI: [10.1038/s41467-020-17709-0](https://doi.org/10.1038/s41467-020-17709-0)

Journal information: [Nature Communications](https://phys.org/news/2020-08-bacteria-sacrifice-brethren-antibiotics.html)
<https://phys.org/news/2020-08-bacteria-sacrifice-brethren-antibiotics.html>



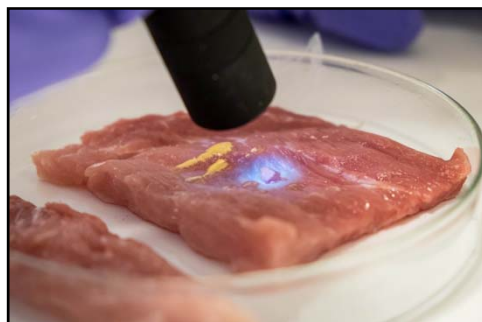
Fri, 21 Aug 2020

Scientists develop 'biorubber' glue for faster surgical recovery and pain relief

Materials scientists from Nanyang Technological University, Singapore (NTU Singapore) have invented a new type of surgical glue that can help join blood vessels and close wounds faster and may also serve as a platform to deliver pain relief drugs.

In a paper published in Elsevier's *Biomaterials* in July jointly with clinicians from Singapore General Hospital (SGH), the NTU researchers showed that their glue can bond soft tissues including muscle and blood vessels, even when their surfaces are wet.

Named CaproGlu, it is activated by a low dose of ultraviolet (UV) light that cures it in seconds, turning it from a liquid glue into a solid but flexible biorubber—a biocompatible material that can be resorbed by the tissue after a few weeks.



Liquid CaproGlu applied to meat being cured by UV light, turning into biorubber. Credit: Nanyang Technological University

The team showed in animal experiments that blood vessels can be rejoined with just four stitches and a mesh wrapper dipped in CaproGlu, compared to the usual eight stitches that are required for a reliable and unobstructed join. The authors estimate that this will reduce surgery time by 25 percent, as surgeons spend less time and effort stitching up blood vessels and tissues.

As demonstrated in animal experiments, CaproGlu can also be used to deliver local anesthetics or pain relief medication to tissues in the body, which may be useful both during and after an operation and would reduce the need for pain relief medication to be administered afterwards.

Unlike current bio-adhesives—which need two chemicals to be mixed prior to use—the CaproGlu is a one-pot liquid gel solution that comes ready-to-use.

Lead authors of the paper, Associate Professor Terry W.J. Steele and Senior Research Fellow Dr. Ivan Djordjevic, emphasized that most surgical adhesives available on the market do not work in water or wet environments as found in the human body.

"To make our light-activated glue work on wet tissues, we engineered our glue to first remove water from the surface and thus allow adhesion to the dehydrated surfaces," said Assoc Prof Steele.

"This unique advantage of being able to bond with high strength in a wet environment, as well as being biocompatible, is what makes CaproGlu so suitable to be used in surgery and medical applications."

The adhesion strength of CaproGlu was compared to other commercial bioadhesives on the market and was found to be three to seven times stronger, and is on a par with the shear strength of collagen and muscle tissue found in the human body.

Benefits of CaproGlu

Invented by Assoc Prof Steele and Dr. Djordjevic from the NTU School of Materials Science and Engineering, CaproGlu combines two ingredients into a single-component formulation that does not require additives.

The first is polycaprolactone—a biodegradable polymer which has been approved by the United States Food and Drug Administration for specific applications used in the human body—and the second: diazirine, a light-sensitive molecule that can form strong bonds when activated.

In their research paper which was published in the scientific journal *Biomaterials*, the scientists demonstrated how CaproGlu could be used as part of a new surgical method, where sutures are used in combination with a glue. Instead of the conventional eight stitches needed to join the two ends of a blood vessel in a rabbit, they used four stitches and wrapped the vessel ends with a biodegradable mesh dipped in CaproGlu and cured with a small dose of UV light which crosslinked the amino acids on the tissue's surface

As a result, the bleeding from the artery immediately after the procedure was comparable to what is observed from conventional stitches. When harvested seven days later, the artery was shown to have completely healed.

In a separate experiment, the surgeons inserted CaproGlu loaded with anesthetics within rats' calves and cured them with UV light before the wound was closed with conventional stitches.

The scientists compared the activity of these rats with two other controls: rats who had received anesthetics alone and rats who had received CaproGlu without anesthetics. They found no discernible impediment of movement for the rats which had anesthetics and CaproGlu loaded with anesthetics, suggesting that CaproGlu is successful in delivering local anesthetics over time and could be a useful way to extend local anesthesia beyond its current limits and also to act as a drug delivery platform for medication such as anticoagulants to prevent excessive blood clotting.

The team also observed that there were no discernible side effects to the animals which had CaproGlu implanted in their skin, which suggested that it is safe and biocompatible as expected. Since the bioadhesive dissolves and resorbs within weeks, no follow up clinical visits would be required for its removal.

Stable shelf life after sterilization

A big challenge for bioadhesives on the market today is to cope with the standard method by which surgical grade equipment and disposables are sterilized using gamma irradiation.

The gamma sterilization process destroys proteins and activates bonding in both acrylate and epoxy adhesives.

Unlike other surgical adhesives available on the market, CaproGlu's protein-free formulation exploits new crosslinking chemistry unaffected by gamma sterilization.

The light-activated bonding mechanism forms chain links to amino acids at the nanoscale level, even after several months of storage and gamma sterilization, thus making CaproGlu's production and commercialisation potentially less costly than those based on proteins and acrylates.

More information: Ivan Djordjevic et al. CaproGlu: Multifunctional tissue adhesive platform, *Biomaterials* (2020). [DOI: 10.1016/j.biomaterials.2020.120215](https://doi.org/10.1016/j.biomaterials.2020.120215)

Journal information: [Biomaterials](https://phys.org/news/2020-08-scientists-biorubber-faster-surgical-recovery.html)
<https://phys.org/news/2020-08-scientists-biorubber-faster-surgical-recovery.html>

Self-excited dancing droplets

By Leah Burrows

Controlling the movement of liquid droplets is important in many applications that generate heat, from power plant condensers to personal computers. Techniques to control droplets on surfaces today include using good old-fashioned gravity, hydrophobic chemical coatings, and temperature gradients.

But what if a droplet could propel itself across a surface without chemicals, pre-programmed gradients or additional energy?

Now, researchers at the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) have described a framework for self-excited droplet movement. The research is published in *Physical Review Letters*.

"Our system of self-excited motion doesn't require any outside forcing or gradient," said Aditi Chakrabarti, a postdoctoral fellow at SEAS and first author of the paper. "It spontaneously creates and responds to gradients by itself."

The system uses a liquid solvent droplet—such as acetone or nail polish remover—on a thin sheet of material. When the droplet first touches the surface, part of the liquid gets absorbed into the material and the material swells. When the material swells, it buckles and creates an incline down which the droplet rolls. Now, the swollen part of the sheet is exposed to the air and the absorbed liquid evaporates, allowing the sheet to regain its original shape.

The same process occurs wherever the droplet moves, creating an oscillating movement that pushes a liquid droplet back and forth between two spots on the surface. The oscillation continues until the droplet shrinks.

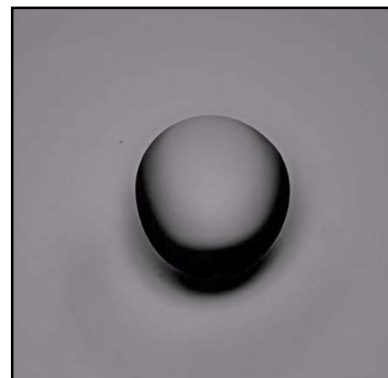
"This see-saw movement is entirely self-driven by the interaction between these three behaviors—absorption-driven swelling, fluid flow and evaporation," said Chakrabarti. "This type of self-generated motion hasn't been explored before and could lead to exciting applications."

The research team used different types of solvents and droplet sizes to generate this behavior on thin sheets.

"Harnessing such behaviors and motion in thin film systems might provide a natural way to drive small-scale engines, oscillators, and pumps," said L. Mahadevan, the Lola England de Valpine Professor of Applied Mathematics, of Organismic and Evolutionary Biology, and of Physics and senior author of the paper. "This system could also provide a simple physical model to understand how biological systems, such as protocells, move."

More information: Aditi Chakrabarti et al. Self-Excited Motions of Volatile Drops on Swellable Sheets, *Physical Review Letters* (2020). DOI: [10.1103/PhysRevLett.124.258002](https://doi.org/10.1103/PhysRevLett.124.258002)

Journal information: [Physical Review Letters](https://phys.org/news/2020-08-self-excited-droplets.html)
<https://phys.org/news/2020-08-self-excited-droplets.html>



This self-propelled droplet platform could be used for self-cleaning surfaces and other applications. Credit: Harvard SEAS



Fri, 21 Aug 2020

Machine-learning model finds SARS-COV-2 growing more infectious

By Adrian De Novato

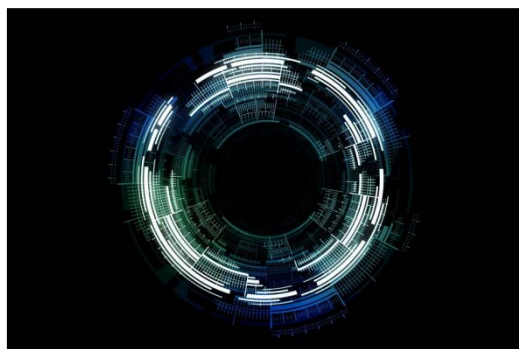
A novel machine learning model developed by researchers at Michigan State University suggests that mutations to the SARS-CoV-2 genome have made the virus more infectious.

The model, developed by lead researcher Guowei Wei, professor in the departments of Mathematics and Biochemistry and Molecular Biology, analyzed SARS-CoV-2 genotyping from more than 20,000 viral genome samples. The researchers analyzed mutations to the spike protein—a protein primarily responsible for facilitating infection—and found that five of the six known virus subtypes are now more infectious.

As with any virus, many mutations are ultimately benign, posing little to no risk to infected patients. Some mutations even reduce infectiousness. But some mutations lead to a more infectious virus.

Wei and his team have studied and analyzed mutation patterns and locations for months, tracking changes against the official viral genome sample captured in January.

"Knowledge about the infectivity of SARS-CoV-2 is a vital factor for preventive measurements against COVID-19 and reopening the global economy," Wei said. "A crucial question is what are the ramifications of these mutations to COVID-19 transmission, diagnostics, prevention and treatment."



Credit: CC0 Public Domain

Viral infection occurs when the spike protein interacts with a human host cell receptor called angiotensin-converting enzyme 2—ACE2 for short. As it relates to ACE2, scientists are concerned about a concept known as binding affinity, or the strength of the binding interaction between the spike protein and host receptor during the initial stage of infection.

"Viral infectivity increases if the binding affinity strengthens," Wei said. "Currently, more than 50 mutations have been found along with the binding interface on the spike proteins receptor-binding domain—RBD for short—which has 194 possible mutation sites."

Wei's machine learning model, an advanced neural network, analyzed more than 8,000 protein interaction records to determine the impact of the current known mutations on the binding affinity of the SARS-CoV-2 spike protein. The result, which suggested increased binding affinity in five of the six known subtypes, indicated that infectivity may have increased as a result of the mutations.

Concerned about the potential for further mutation, Wei and his team turned their model to the future.

"It's extremely important to know whether future SARS-CoV-2 subtypes would pose an imminent danger to public health," Wei said. "To this end, we have conducted a systematic screening of all possible 3,686 future mutations on 194 possible mutation sites along the RBD."

Wei's model predicts that multiple residues on the receptor-binding motif—a component area of the RBD—have high chances to mutate into more infectious COVID-19 strains.

He cautions that although artificial intelligence based predictions are consistent with available experimental findings, further studies are needed to fully understand mutation impacts on COVID-19 infectivity, which is vital to the public health response to COVID-19.

As part of their research, Wei and team also predict that the novel coronavirus spreading around the world is slightly more infectious than the original SARS virus discovered in 2003.

Wei said the results align with those of another study recently published by researchers at the Scripps Research Institute in Florida. This study examined spike protein mutations in a laboratory setting, also finding that the virus is mutating in ways that increase its infectiousness.

The paper, "Mutations strengthened SARS-CoV-2 infectivity, along with much of the published research concerning COVID-19 and the SARS-CoV-2 virus," appears on the preprint server ArXiv.

More information: Chen et al., Mutations strengthened SARS-CoV-2 infectivity. arXiv:2005.14669v1 [q-bio.BM]. arxiv.org/pdf/2005.14669.pdf

The D614G mutation in the SARS-CoV-2 spike protein reduces S1 shedding and increases infectivity. www.scripps.edu/files/pdfs/news-and-events/The%20D614G%20mutation%20in%20the%20SARS-CoV-2%20spike%20protein%20reduces%20S1.pdf

<https://phys.org/news/2020-08-machine-learning-sars-cov-infectious.html>

hindustantimes

Fri, 21 Aug 2020

Covid-19: Children are silent spreaders of coronavirus, study finds

The study, published in the Journal of Pediatrics, also challenges the current hypothesis that because children have lower numbers of immune receptors for SARS-CoV2, the virus that causes Covid-19, this makes them less likely to become infected or seriously ill

Washington: Children play a larger role in the community spread of Covid-19 than previously thought, according to a study which found that the younger people may not be as likely to become seriously ill as adults, but they can spread infection and bring the virus into their homes.

The study, published in the Journal of Pediatrics, also challenges the current hypothesis that because children have lower numbers of immune receptors for SARS-CoV2, the virus that causes Covid-19, this makes them less likely to become infected or seriously ill.

In the study of 192 children ages 0-22, 49 children tested positive for SARS-CoV-2, and an additional 18 children had late-onset, Covid-19-related illness, according to the researchers from Massachusetts General Hospital (MGH) in the US.

The infected children were shown to have a significantly higher level of virus in their airways than hospitalised adults in ICUs for Covid-19 treatment, they said.

"I was surprised by the high levels of virus we found in children of all ages, especially in the first two days of infection," said Lael Yonker, from MGH, and lead author of the study.

"I was not expecting the viral load to be so high. You think of a hospital, and of all of the precautions taken to treat severely ill adults, but the viral loads of these hospitalised patients are significantly lower than a 'healthy child' who is walking around with a high SARS-CoV-2 viral load," Yonker said.

The findings from nose and throat swabs and blood samples carry implications for the reopening of schools, day care centres and other locations with a high density of children and close interaction with teachers and staff members.

"Kids are not immune from this infection, and their symptoms don't correlate with exposure and infection," said Alessio Fasano, director of the Mucosal Immunology and Biology Research Center at MGH.

“During this Covid-19 pandemic, we have mainly screened symptomatic subjects, so we have reached the erroneous conclusion that the vast majority of people infected are adults.

However, our results show that kids are not protected against this virus. We should not discount children as potential spreaders for this virus,” Fasano said.

(This story has been published from a wire agency feed without modifications to the text. Only the headline has been changed.)

<https://www.hindustantimes.com/health/covid-19-children-are-silent-spreaders-of-coronavirus-study-finds/story-TDt9TFgAg1F5WNsrTnVoDN.html>

hindustantimes

Fri, 21 Aug 2020

Serum Institute registers its Covid-19 vaccine trial

Confirming that the Covid-19 vaccine trial process has started, representatives of SII declined to reveal any more details on the development

By Rhythm Kaul

New Delhi: The Serum Institute of India (SII) has registered for Phase II/III clinical trials on the coronavirus disease (Covid-19) vaccine candidate, Covishield, being developed by Oxford University-Astra Zeneca, with the Clinical Trials Registry of India (CTRI). The trials will be conducted on 1,600 healthy participants across India.

The All India Institute of Medical Sciences, New Delhi, is one of the 17 sites selected to conduct the trial - a Phase II/III, observer-blind, randomized, controlled study, to check the safety and immune response of the Covid-19 vaccine candidate on healthy Indian adults.

The study is planned for a duration of seven months, and the date of first enrolment will be August 24, as reported to the CTRI.

Serum Institute, the world's largest vaccine manufacturer by number of doses produced and sold globally, has entered a manufacturing partnership with AstraZeneca to produce the vaccine, if and when it is approved for use.

On August 3, India's drugs controller gave approval to SII for conducting Phase II and III clinical trials of the vaccine candidate in the country. The trials will be overseen by Dr Prasad Kulkarni as the principal investigator for SII.

Confirming that the trial process has started, representatives of SII declined to reveal any more details on the development.

The 17 hospitals that will be conducting these trials are Andhra Medical College, Visakhapatnam; JSS Academy of Higher Education and Research, Mysore; Seth G. S. Medical College and KEM Hospital, Mumbai; KEM Hospital Research Centre, Vadu; B J Medical College and Sassoon General Hospital, Pune; All India Institute Of Medical Sciences (AIIMS), Jodhpur; Rajendra Memorial Research Institute of Medical Sciences, Patna; Institute of Community Medicine, Chennai; Post-Graduate Institute of Medical Education & Research (PGIMER), Chandigarh; Bharati Vidyapeeth Deemed University Medical College and Hospital, Pune; Jehangir Hospital, Pune; All India Institute of Medical Sciences, New Delhi, ICMR-Regional Medical Research Centre, Gorakhpur; Sri Ramchandra Institute of Higher Education and Research, Chennai; TN Medical College & BYL Nair Hospital, Mumbai; Mahatma Gandhi Institute of Medical Sciences, Sewagram; and Government Medical College, Nagpur.

Barring one hospital- KEM Hospital Research Centre Ethics Committee, Pune, which has received the mandatory approval, ethics committee approval is still under process for the remaining 16 hospitals, shows a CTRI document.



Vaccine vials exit a vaccine vial monitor labelling machine at the Serum Institute of India Ltd. pharmaceutical plant in Pune, Maharashtra. (Bloomberg File Photo)

Institute ethics committee clearance is a mandatory criterion to begin any clinical studies in India.

The vaccine is made from a weakened version of a common cold adenovirus taken from chimps and genetically modified.

“The Oxford University-Astra Zeneca vaccine candidate seems like the best bet at the moment but the stages at which all these vaccines candidates are currently, it could go either way. There is always a possibility that none of these might eventually work out but that doesn’t mean there should not be any planning for procurement or distribution,” says Dr K Srinath Reddy, founder, Public Health Foundation of India.

Healthy participants, both men and women, selected for the trial are above 18 years of age.

Those who are not eligible include people with acute illness with or without fever at the time of study vaccine administration, history of laboratory confirmed Covid-19 disease in household contacts or close workplace contacts, IgG seropositivity (antibodies) to Sars-Cov-2, history or currently positive for Sars-Cov-2 by real-time Reverse Transcription Polymerase Chain Reaction (rRT-PCR), history of severe allergic reactions after previous vaccinations or hypersensitivity to any component of study vaccines, any confirmed or suspected condition with impaired/altered function of immune system, and pregnant women.

<https://www.hindustantimes.com/india-news/serum-institute-registers-its-covid-vaccine-trial/story-I7USDU7cfvIYYjUV2RK8sN.html>

hindustantimes

Fri, 21 Aug 2020

Russia looking for partnership with India to produce Covid vaccine: RDIF CEO

Sputnik V has been developed by the Gamaleya Research Institute of Epidemiology and Microbiology, along with the RDIF. The vaccine has not been tested in Phase 3 or larger clinical trials

New Delhi: Russia is looking for a partnership with India for producing Covid-19 vaccine Sputnik V, Kirill Dmitriev, the CEO of the Russian Direct Investment Fund (RDIF), said on Thursday.

Russian President Vladimir Putin had announced that his country has developed the world’s first vaccine against Covid-19, which works “quite effectively” and forms a “stable immunity” against the disease.

Sputnik V has been developed by the Gamaleya Research Institute of Epidemiology and Microbiology, along with the RDIF. The vaccine has not been tested in Phase 3 or larger clinical trials.

Addressing an online press briefing, Dmitriev said several nations are interested in the production of the vaccine from countries in Latin America, Asia and the Middle East.

“The production of the vaccine is a very important issue. Currently, we are looking for a partnership with India. We believe that they are capable of producing the Gamaleya vaccine and it is very important to say that those partnerships to produce the vaccine will enable us to cover the demand that we have,” he said.

Dmitriev said Russia is looking forward to international cooperation.

“We are going to do clinical trials not just in Russia but also in the UAE, Saudi Arabia, probably in Brazil and India. We are planning to produce the vaccine in more than five countries and there is a very high demand from Asia, Latin America, Italy and other parts of the world regarding the delivery of the vaccine,” he said.

Alexander Gintsburg, the director of the Gamaleya Research Institute of Epidemiology and Microbiology and an academician at the Russian Academy of Sciences, said more than 20,000 people have taken part in the clinical trials of vaccines and drugs, based on human adenoviruses or human adenoviral vectors.

“Vaccines do not contain live human adenoviruses, but human adenovirus vectors, that is, human viruses that cannot multiply in the body and are completely safe,” he said.

The Sputnik V vaccine consists of two shots that use different versions of adenoviruses -- virus types, some of which cause the common cold -- that the manufacturers have engineered to carry the gene for the surface protein of SARS-CoV-2 that causes Covid-19.

“The approach of the Gamaleya Institute with the vaccine, using two human adenoviruses serotypes: number 5 (Ad5) and number 26 (Ad26), has a clear advantage over the one-vector approach used by other developers,” Gintsburg said.

<https://www.hindustantimes.com/india-news/russia-looking-for-partnership-with-india-to-produce-covid-vaccine-rdif-ceo/story-UVKM9MpOy3w1sD7bqZISNO.html>

ThePrint

Fri, 21 Aug 2020

Bharat Biotech wants to test administering Covid vaccine through skin instead of muscle

Intradermal vaccine delivery, if proven effective, could make Covaxin shots cheaper since they require a lesser amount of vaccine, which also means more people can get vaccinated

By Himani Chandna

New Delhi: Hyderabad-based Bharat Biotech may add another arm to its ongoing clinical trial of indigenous Covid-19 vaccine Covaxin, where volunteers will be administered the vaccination through a different method.

The company is working on the Covid-19 vaccine project along with the country’s top health research body, the Indian Council of Medical Research (ICMR).

Bharat Biotech is already running a clinical trial at 12 selected sites across the country where “healthy volunteers” have been administered vaccination shots directly into the muscles.

In its latest proposal, Bharat Biotech intends to conduct trials using “intradermal (ID) vaccine delivery route”, which has been approved by the Subject Expert Committee (SEC), a body under the Central Drugs Standard Control Organisation (CDSCO). The CDSCO is a health ministry arm that regulates the quality of drugs and vaccines in the country.

Under the ID route, the vaccine shot is given in the dermis, one of the layers of the skin. The shot is less invasive, requires lesser dosage and sometimes, helps the vaccine show better immune response.

“The firm presented their proposal for conduct of phase I/II clinical trial of CoronaVirus Vaccine by intradermal (ID) route. The firm also presented their animal toxicity data generated through intradermal route and interim safety data from phase I study through intramuscular route,” said the minutes of a 13 August meeting which have been uploaded on the website of the CDSCO.

“After detailed deliberation, the committee recommended for grant of permission to conduct the phase I/II clinical trial through ID route,” the SEC noted while adding two conditions to the approval.

The conditions are that participants should be “followed up for six months” where they will be checked on how much antibodies against Covid-19 have been produced, apart from checking their general body parameters.

The SEC has also asked that clinical trial sites of this study “should be different from the sites of the intramuscular study”.

The SEC, however, only advises CDSCO’s head, the Drug Controller General of India (DCGI), on applications seeking approvals for new drugs, vaccines, and clinical trials for Covid-19. The final call on the proposals will be taken by DCGI V.G. Somani.

Intradermal vaccine delivery

According to the World Health Organization (WHO), there has been a renewed interest in intradermal vaccine delivery.

The interest is driven by the fact that “the dermis and epidermis of human skin are rich in antigen-presenting cells”, suggesting that delivery of vaccines to these layers, rather than to muscle or subcutaneous tissue, should be more efficient and induce protective immune responses with smaller amounts of vaccine antigen.

So far, most vaccines have been delivered by the muscular routes or through the fat layer, underneath the skin. The ID route vaccine delivery is generally used for the administration of selected vaccinations, such as Bacille Calmette-Guérin (BCG) and rabies.

ID delivery could decrease cost vaccine shot

The main advantage of ID vaccine administration is that smaller amounts of vaccines are needed as compared to intramuscular routes, health experts said.

“This method could help in dose-sparing. So you could potentially increase the number of people you are able to vaccinate with the same amount of vaccine. This can also decrease the per injection cost, which is relevant from a public health perspective,” said Anant Bhan, a researcher in global health, bioethics and health policy and former president of International Association of Bioethics.

“However, clinical trials are needed to evaluate and compare if the intradermal administration performs comparably in eliciting an immune response which is protective in nature as an intramuscular route administration.”

Dr P.K. Tyagi, an expert in community medicine, echoed similar observations.

“The company might be testing the efficacy (through this route) as ID requires less dosage. Also, the cost to the company will go down if immunogenicity (ability to induce an immune response) attained is comparable or better against the intramuscular route,” Dr Tyagi said.

<https://theprint.in/health/bharat-biotech-wants-to-test-administering-covid-vaccine-through-skin-instead-of-muscle/485949/>

