

July  
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: 170 22 July 2020



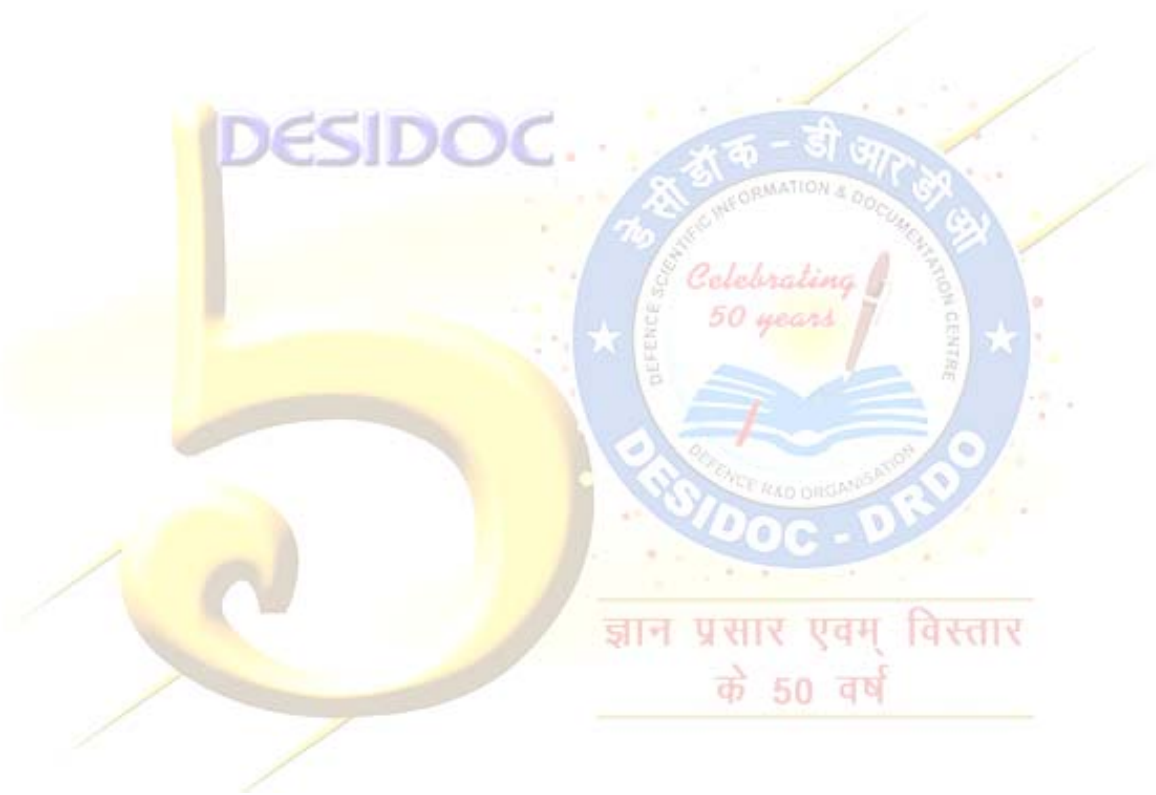
रक्षा विज्ञान पुस्तकालय  
Defence Science Library  
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र  
Defence Scientific Information & Documentation Centre  
मेटकॉफ हाउस, दिल्ली - 110 054  
Metcalf House, Delhi - 110 054

## CONTENT

S. No.	TITLE	Page No.
<b>DRDO News</b>		<b>1-9</b>
<b>DRDO Technology News</b>		<b>1-9</b>
1.	DRDO develops drone to monitor border areas	1
2.	Now, a made-in-India drone to monitor Chinese aggression along the LAC	2
3.	पूर्वी लद्दाख में एलएसी की कड़ी निगरानी के लिए सेना को मिले बेहद शक्तिशाली 'भारत' ड्रोन	3
4.	डीआरडीओ ने सेना को दिए अत्याधुनिक 'भारत ड्रोन', सीमा पर होगी सटीक निगरानी	4
5.	चीन के साथ विवाद के बीच सेना को मिले अत्याधुनिक 'भारत ड्रोन', सीमा पर होगी सटीक निगरानी	5
6.	India, US negotiating UAV co-development programme: Pentagon official	6
7.	IAF indicates it does not want U.S. made NASAMS-II missiles, Prefers made in India BMD system	7
8.	IAF indicates it does not want U.S. made NASAMS-II missiles, Prefers made in India BMD system	8
<b>Defence News</b>		<b>10-22</b>
<b>Defence Strategic National/International</b>		<b>10-22</b>
9.	IAF commanders' 3-day meet begins today; India-China border situation, deployment of Rafale jets on agenda	10
10.	Ladakh: Chinese positions unchanged since last Corps Commanders meet, says officer	11
11.	Four sub-killer P-8I craft coming to India next year, then talks for six more	12
12.	Amid border row with China, Navy's MiG-29K fighter aircraft to be deployed in northern sector	13
13.	चीनी सेना की गतिविधियों पर नजर रखने के लिए तैनात होंगे नौसेना के लड़ाकू विमान मिग-29 K	14
14.	Amidst India-China standoff, security agencies keeping close eye on Barahoti in U'khand	15
15.	Rafale coming in! How Rafale fighter jets fare against the Chinese PLAAF fighters?	16
16.	To deal with the China threat that's looming on the LAC, revive the Mountain Strike Corps	18
17.	India designed two-front war theory to draw US' economic, diplomatic and military support	19
18.	China common worry, India and US step up military, intel ties	21
19.	India-US naval drill shows ability to project power with allies, says US defence secretary	22
<b>Science &amp; Technology News</b>		<b>23-37</b>
20.	Chandrayaan-2 data to be released globally from Oct: ISRO	23
21.	Specialized cellular compartments discovered in bacteria	24
22.	New research reveals antifungal symbiotic peptide in legume	25
23.	Researchers discover new chemistry of 2-D transition metal carbides and carbonitrides	26
24.	Higher-order topology found in 2D crystal – "A variety of exciting physics to be explored"	27

<b>COVID-19 Research</b>		<b>29-37</b>
25.	Covid-19 pandemic: Wave of promising study results raises hopes for coronavirus vaccines	29
26.	'Russia's first COVID-19 vaccine ready for use': Russian Defence Minister	31
27.	Lancet: 'Chinese phase 2 trial finds vaccine safe, induces immune response'	32
28.	Decoding Oxford's Covid-19 vaccine results and why they offer hope	33
29.	Immunotherapy safe for patients with COVID-19, cancer	34
30.	Coronavirus vaccine update: Oxford, Wuhan Covid vaccines promise immunity	35

-----



# The Tribune

Wed, 22 July 2020

## **DRDO develops drone to monitor border areas**

*Expected to be deployed along LAC in eastern Ladakh*

*By Vijay Mohan*

Chandigarh: The Defence Research and Development Organisation (DRDO) has developed an unmanned aerial vehicle for real-time surveillance of border areas and monitoring activities in difficult terrain. It is first expected to be deployed with Army units along the Line of Actual Control (LAC) in eastern Ladakh as the stand-off with China in eastern Ladakh continues and the disengagement of troops is facing hurdles.

The drone, christened 'Bharat', has been developed by DRDO's Terminal Ballistics Research Laboratory (TBRL), and is a further development of the drone that had been developed earlier by TBRL in response to the requirements for technologies to mitigate the COVID-19 threat.

"The drone is capable of providing real-time video feed as well as still images to its operators and its controlling software has built-in artificial intelligence tools for analysis and decision-making," a senior DRDO scientist said. "Besides the armed forces, It also has the potential for being used by the Central Armed Police Forces and law enforcement agencies," he added.

The design of the drone is said to incorporate low observable features to make its detection difficult by the adversary. Projected to be among the world's lightest and most agile and surveillance platforms, it has an operational range of a few kilometres and is meant for tactical intelligence gathering and surveillance in a localised area.

Bharat has been designed entirely by TBRL, which is involved in development, production, processing and characterisation of different high-explosive compositions, fragmentation studies of warheads, captive flight testing of bombs, missiles and airborne systems and ballistics evaluation of protective systems like body armour, vehicle armour and helmets.

It has also developed other products like face shields and examination enclosures for the medical fraternity and contactless sanitizer dispenser for use in the fight against COVID-19.

Bharat has been ruggedised to operate in high altitude areas and in extreme climatic conditions. Its payload includes an array of sensors, including infrared and night vision equipment to operate in varied geographical environments.

Advanced drones for use by local commanders in the field within their own area of responsibility have for long been on the Army's wish list and some variants with different operational capability are already in service.



The drone, christened 'Bharat', has been developed by DRDO's Terminal Ballistics Research Laboratory, Chandigarh to monitor border areas.



The Army is also looking at employment of miniature drones to keep a watch on mountain passes during winters when high snow makes the movement of troops or manning forward outposts difficult.

<https://www.tribuneindia.com/news/nation/drdo-adapts-drone-developed-for-covid-19-surveillance-to-monitor-borders-115948>

**TIMESNOWNEWS.COM**

Wed, 22 July 2020

## Now, a made-in-India drone to monitor Chinese aggression along the LAC

*The indigenously-developed drone can also undertake night missions and detect humans hidden under deep forest covers*

### Key Highlights

- *The stealthy drone cannot be detected by enemy radars*
- *It has been designed to operate under rough weather conditions*

New Delhi: On the backdrop of the recent standoff along the Line of Actual Control (LAC), the Indian Army has been provided special made-in-India drone by the Defence Research and Development Organisation (DRDO). The unmanned aerial vehicle (UAV), named Bharat, has been developed by Chandigarh-based laboratory of the DRDO.

Touted by the developers to be one of the 'world's most agile and lightest surveillance drones', the UAV has been developed fully indigenously by the DRDO. According to DRDO sources cited by news agency ANI, the "small yet powerful drone works autonomously at any location with great accuracy. The unibody biomimetic design with advance release technology is a lethal combination for surveillance missions".



Bharat drone, developed by DRDO  
Photo Credit: ANI

Interestingly, the drone is equipped with artificial intelligence to detect friends and foes and then respond accordingly. Capable of surviving in extreme cold, the surveillance equipment has been developed keeping in mind extreme weather conditions along the LAC.

With transgression by the Chinese troops along the LAC as the major challenge, the drone also provides real-time video transmission during the mission and can even detect humans hidden under deep forest covers. The drone has also been equipped with night vision capabilities and its stealthy design ensures that its signature remains undetected from enemy radars.

"The Indian Army requires drones for accurate surveillance in the ongoing dispute in the Eastern Ladakh area. For this requirement, the DRDO has provided the Bharat drones to it," a defence source was quoted as saying in the agency report.

### Recently, MoD also enhanced financial powers of military generals

The acquisition of the drone may be viewed on the backdrop of the recent standoff between Indian and Chinese armies along the LAC. The impasse which began in May was resolved only weeks ago after a series of meetings between military commanders and diplomats of the two countries. PM Narendra Modi also visited the areas along the LAC to boost the morale of the troops posted along the frontiers.

In view of the Chinese aggression along the LAC, most recently, the defence ministry enhanced the financial powers of military generals to ensure the quicker acquisition of critical military hardware.

<https://www.timesnownews.com/india/article/now-a-made-in-india-drone-to-monitor-chinese-aggression-along-the-lac/624892>

## पूर्वी लद्दाख में एलएसी की कड़ी निगरानी के लिए सेना को मिले बेहद शक्तिशाली 'भारत' ड्रोन

**Bharat Drone :** भारत के रक्षा अनुसंधान एवं विकास संगठन (DRDO) पूर्वी लद्दाख के चुनौतीपूर्ण इलाके की निगरानी के लिए बेहद ताकतवर ड्रोन बनाया है। भारत ड्रोन को आर्मी को सौंप दिया गया है। इस ड्रोन की खासियत यह है कि यह रेडार की पकड़ में आए बिना बेहद सटीक जानकारी मुहैया कराता है।

Edited By Naveen Kumar Pandey

### हाइलाइट्स

- डीआरडीओ द्वारा विकसित भारत ड्रोन की निगरानी क्षमता बेहद उच्च स्तर की है
- इसे पूर्वी लद्दाख के ऊंचे और दुर्गम इलाकों की निगरानी के काम पर लगाया गया है
- भारत ड्रोन में उच्च स्तर का आर्टिफिशियल इंटेलिजेंस और कैमरा लगा हुआ है
- यह ड्रोन दोस्तों और दुश्मनों में फर्क कर यथोचित कार्रवाई करता है

नई दिल्ली: पूर्वी लद्दाख में वास्तविक नियंत्रण रेखा (LAC) के पास विभिन्न इलाकों में अतिक्रमण की कोशिशों के बाद चीन पर रहा-सहा भरोसा भी खत्म हो चुका है। यही कारण है कि अब भारत चीन की पीपल्स लिबरेशन आर्मी (PLA) की हर गतिविधि पर कड़ी नजर रखने के साधन दुरुस्त कर रहा है। इसी क्रम में देश में ही विकसित बेहद ताकतवर ड्रोन सेना को सौंपे जा रहे हैं। रक्षा अनुसंधान एवं विकास संस्थान (DRDO) में निर्मित ड्रोन का नाम 'भारत' दिया गया है जो ऊंचाई वाले इलाकों और पहाड़ी क्षेत्रों की निगरानी में अद्भुत क्षमता का प्रदर्शन करता है। यही वजह है कि भारत ड्रोन को पूर्वी लद्दाख के पास एलएसी पर ही निगरानी के लिए रखा जा रहा है।

### रेडार की पकड़ से बाहर

रक्षा सूत्रों ने कहा, 'पूर्वी लद्दाख में जारी तनाव के बीच भारतीय सेना को सटीक निगरानी के लिए ड्रोनों की जरूरत है। इसे पूरा करने के लिए डीआरडीओ ने सेना को भारत ड्रोन्स दिए हैं।' यह ड्रोन इस तरीके से बनाया गया है कि इसे रेडार की पकड़ में लाना असंभव है।



बेहद ताकतवर है देश में बना भारत ड्रोन।

### दुनिया के सबसे चालाक ड्रोनों में एक

भारत ड्रोन डीआरडीओ के चंडीगढ़ स्थित प्रयोगशाला में विकसित किए गए हैं। अब इस इन ड्रोनों को लिस्ट करवाने की योजना है। डीआरडीओ के सूत्रों ने कहा, 'भारत सीरीज के ड्रोनों को दुनिया के सबसे चालाक, मुस्तैद, फुर्तीला और हल्के सर्वांगीण ड्रोन के रूप में लिस्ट करवाया जा सकता है। इसे डीआरडीओ ने तैयार किया है।'

### दोस्त और दुश्मन में कर लेता है अंतर

सूत्रों ने कहा कि यह एक छोटा लेकिन बेहद ताकतवर ड्रोन है जो किसी भी स्थान की निगरानी करते वक्त बेहद सटीक जानकारी देता है। अडवांस रिलीज टेक्नॉलजी के साथ इसकी यूनिबॉडी बायोमिमेटिक डिजाइन से सर्वोच्च स्तर की निगरानी होती है। आर्टिलफिशियल इंटेलिजेंस से लैस भारत ड्रोन दोस्तों और दुश्मनों में आसानी से अंतर कर लेता है और इसी के अनुकूल ऐक्शन भी लेता है।

## अडवांस AI और कैमरे की ताकत

ड्रोन की क्षमता अत्यंत ठंडे मौसम और रात के घुप अंधेरे में भी निगरानी करने की है। इसे मौसम के और अधिक कठिन हालात के लिहाज से डिवेलप किया जा रहा है। यह पूरे मिशन का रियल-टाइम वीडियो भेजता है। इसमें लगा रात के अंधेरे में भी देखने की क्षमता वाला बेहद उच्चतम श्रेणी का कैमरा घने जंगलों में छिपे लोगों को भी तलाश लेता है। सूत्रों ने बताया कि भारत ड्रोन झुंड में भी ऑपरेशन करता है, इस कारण इसकी लोकप्रियता तेजी से बढ़ रही है।

<https://navbharattimes.indiatimes.com/india/indian-army-gets-very-advanced-bharat-drones-for-accurate-surveillance-on-chinese-borede/articleshow/77085014.cms>

# अमर उजाला

Wed, 22 July 2020

## डीआरडीओ ने सेना को दिए अत्याधुनिक 'भारत ड्रोन', सीमा पर होगी सटीक निगरानी

नई दिल्ली: भारत और चीन के बीच चल रहे सीमा विवाद के बीच डीआरडीओ (रक्षा अनुसंधान एवं विकास संगठन) ने भारतीय सेना को स्वदेश में विकसित 'भारत' ड्रोन उपलब्ध कराए हैं। पूर्वी लद्दाख में वास्तविक नियंत्रण रेखा पर ये ड्रोन अधिक ऊंचाई वाले इलाकों और पर्वतीय क्षेत्रों में सटीक निगरानी सुनिश्चित करेंगे।

समाचार एजेंसी एएनआई के मुताबिक रक्षा सूत्रों ने कहा, 'पूर्वी लद्दाख क्षेत्र में चल रहे विवाद को देखते हुए भारतीय सेना को सटीक निगरानी के लिए ड्रोन की आवश्यकता थी। इस जरूरत को पूरा करने के लिए डीआरडीओ ने सेना को भारत ड्रोन उपलब्ध कराए हैं।' ये ड्रोन डीआरडीओ की चंडीगढ़ स्थित प्रयोगशाला ने विकसित किए हैं।

### आर्टिफिशियल इंटेलिजेंस से हैं लैस

इस ड्रोन को आर्टिफिशियल इंटेलिजेंस (कृत्रिम बुद्धिमत्ता) से लैस किया गया है जिससे यह दोस्तों और दुश्मनों के बीच फर्क करके उसी हिसाब से काम कर सके। इसके अलावा इन्हें इस तरह से तैयार किया गया है कि ये बहुत ज्यादा ठंडे मौसम में भी काम कर सकने में सक्षम हैं।

### नाइट विजन की सुविधा भी मौजूद

इसके साथ ही यह अत्याधुनिक नाइट विजन सुविधा से भी लैस है। यह घने जंगल में छिपे इंसानों का पता लगा सकता है। यह ड्रोन अभियान के दौरान रियल टाइम वीडियो ट्रांसमिशन उपलब्ध कराता है। ऐसे में सीमा पर भारत के लिए यह ड्रोन बहुत फायदेमंद साबित हो सकते हैं। भारत सीरीज के ये ड्रोन दुनिया के सबसे हल्के और सक्रिय निगरानी ड्रोन में शामिल किए जा सकते हैं।

### रडार की पहुंच से भी बाहर है ये ड्रोन

डीआरडीओ के सूत्रों ने कहा, 'छोटा मगर शक्तिशाली ड्रोन किसी भी स्थान से अत्यधिक सटीकता के साथ काम कर सकता है। इसकी यूनिबॉडी डिजाइन और एडवांस रिलीज टेक्नोलॉजी इसे निगरानी अभियानों के लिए अधिक उपयुक्त बनाती है।' इसे इस तरह से बनाया गया है कि रडार भी इसे डिटेक्ट नहीं कर सकता है, यानी रडार भी इस ड्रोन का पता नहीं लगा सकता।

<https://www.amarujala.com/india-news/indian-army-gets-bharat-drone-for-acute-surveillance-amid-india-china-border-dispute>



## चीन के साथ विवाद के बीच सेना को मिले अत्याधुनिक 'भारत ड्रोन', सीमा पर होगी सटीक निगरानी

**भारत और चीन के बीच चल रहे सीमा विवाद (India-China dispute) के बीच, DRDO ने पूर्वी लद्दाख (Eastern Ladakh) में वास्तविक नियंत्रण रेखा के साथ उच्च ऊंचाई वाले क्षेत्रों और पहाड़ी इलाकों में सटीक निगरानी रखने के लिए सेना को 'भारत' (Bharat drones) नाम का स्वदेश में विकसित ड्रोन दिया है।**

नई दिल्ली: भारत और चीन के बीच चल रहे सीमा विवाद (India-China dispute) के बीच, DRDO ने पूर्वी लद्दाख (Eastern Ladakh) में वास्तविक नियंत्रण रेखा की निगरानी के लिए सेना को 'भारत ड्रोन' (Bharat Drone) दिया है। इस ड्रोन का नाम 'भारत' है। यह पूरी तरह से स्वदेशी ड्रोन है। वास्तविक नियंत्रण रेखा की निगरानी के साथ ही यह ड्रोन ज्यादा ऊंचाई वाले क्षेत्रों और पहाड़ी इलाकों की सटीक निगरानी रखने में भारतीय सेना की मदद करेगा। रक्षा सूत्रों ने कहा, 'भारतीय सेना को पूर्वी लद्दाख क्षेत्र में चल रहे विवाद में सटीक निगरानी के लिए ड्रोन की आवश्यकता है।'

भारत-चीन सीमा पर तैनाती के लिए विशेष तौर पर तैयार किए गए भारत ड्रोन को रक्षा अनुसंधान एवं विकास संगठन (DRDO) की चंडीगढ़ स्थित प्रयोगशाला में तैयार किया गया है। रक्षा सूत्रों का कहना है कि ड्रोन की भारत श्रृंखला को विश्व के सबसे चुस्त और हल्के निगरानी ड्रोन के रूप में सूचीबद्ध किया जा सकता है। यह पूरी तरह से स्वदेशी है।

### दुश्मनों की कर सकता है पहचान

- इस ड्रोन को आर्टिफिशियल इंटेलिजेंस (कृत्रिम बुद्धिमत्ता) से लैस किया गया है जिससे यह दोस्तों और दुश्मनों के बीच फर्क करके उसी हिसाब से काम कर सके।
- भारत-चीन सीमा पर मौसम को देखते हुए ड्रोन को ठंडे मौसम में काम करने के लिए भी सक्षम बनाया गया है। इसके साथ ही विभिन्न मौसम के अनुसार इसको विकसित करने की प्लानिंग की जा रही है।
- भारत ड्रोन मिशन के दौरान रियल टाइम वीडियो प्रसारण करने में सक्षम है। इसके साथ ही अंधेरी रातों में भी यह ड्रोन पूरी तरह के क्लियर विजुअल दिखा सकता है।
- DRDO के सूत्रों के अनुसार इस ड्रोन को खास तौर पर ऐसे डिजाइन किया गया है, जिससे यह गहरे जंगलों में छिपे इंसानों का भी पता लगा सकता है।
- भारत सीरीज के ये ड्रोन दुनिया के सबसे हल्के और सक्रिय निगरानी ड्रोन में शामिल किए जा सकते हैं।

### रडार की पहुंच से भी बाहर है ये ड्रोन

DRDO के सूत्रों का कहना है, 'छोटा मगर शक्तिशाली ड्रोन किसी भी स्थान से अत्यधिक सटीकता के साथ काम कर सकता है। इसकी यूनिबॉडी डिजाइन और एडवांस रिलीज टेक्नोलॉजी इसे निगरानी अभियानों के लिए अधिक उपयुक्त बनाती है।' इसे इस तरह से बनाया गया है कि रडार भी इसे डिटेक्ट नहीं कर सकता है, यानी रडार भी इस ड्रोन का पता नहीं लगा सकता।

<https://hindi.news18.com/news/nation/indian-army-gets-bharat-drones-for-accurate-surveillance-along-china-border-3182862.html>



## India, US negotiating UAV co-development programme: Pentagon official

*Often described as the Pentagon's chief weapons buyer, Lord said that US-India defence cooperation has made great strides in the last few years*

The US and India are negotiating a co-development programme for the air-launched unmanned aerial vehicle (UAV), a top Pentagon official said Tuesday.

I would like to highlight a very exciting project we are currently negotiating -- air-launched unmanned aerial vehicle or UAV will be a co-development programme between the US Air Force Research Labs, the Indian Air Force, India's Defense Research and Development Organisation, and an Indian startup company, said Ellen M Lord, Under Secretary of Defence for Acquisition and Sustainment.

Addressing the India Idea's Summit organised by the US-India Business Council, the top Pentagon official said that the US Air Force research labs have signed a cooperative research and development agreement with the Indian startup to support the development of the air-launched UAV.

The Pentagon's point person for the ambitious US-India Defence Technology and Trade Initiative (DTTI), Lord said that they are planning to hold the next DTTI group meeting the week of September 14 and the second meeting of the DTTI industrial collaboration forum the week before.

Often described as the Pentagon's chief weapons buyer, Lord said that US-India defence cooperation has made great strides in the last few years.

This cooperation has led to closer relationships across the two governments, and it has also increased stability in the Indo-Pacific region.

Noting that US Defense sales to India have grown exponentially over the last 10 years, she said the US is striving to become India's first choice in defence solutions.

The last year has seen many firsts in DTTI, she said adding that the first project agreement for co-development is in negotiation.

The first industrial cooperation forum was held, she said. She also announced the release of industrial guidance for participation with DTTI.

Industrial cooperation is a key focus area for the future of defence collaboration, and we think that this industry guidance will increase industrial collaboration within the DDTI framework," she said.

"The United States welcomes any partnership that enhances US national security objectives, decreases defence procurement costs and leads to greater supply chain stability, Lord said.

Noting that the US government reviewed and commented on India's defence procurement procedure or DPP, Lord said they were encouraged to see procedures for loans and leases added.

The United States is aware that many countries including India use offset in defence sales. The US government will not take part in any negotiation concerning offsets between industry and a foreign government. We encourage all governments to ensure that offset processes are transparent and applied equally to all competitors, Lord said.

[https://www.business-standard.com/article/economy-policy/india-us-negotiating-uav-co-development-programme-pentagon-official-120072200044\\_1.html](https://www.business-standard.com/article/economy-policy/india-us-negotiating-uav-co-development-programme-pentagon-official-120072200044_1.html)



She said the US is striving to become India's first choice in defence solutions

## **IAF indicates it does not want US made NASAMS-II missile system, prefers made in India BMD set up**

The Indian Air Force has, according to LiveFist, indicated to the government that it would rather spend its budgets on the locally developed ballistic missile defense system (BMD) than buying United States (US) made NASAM-II networked air defense system.

India had been offered the NASAM-II system following India's choice of S-400 Tirumpf air defense system of Russia. However, a steep price tag - nearly two billion dollars, had stalled the negotiations between India and the US.

In February this year it was reported that the proposed acquisition of NASAM-II was part of replacing legacy Russian air defence systems currently being used to protect high security areas of New Delhi.

It was reported that the NASAMS could form the innermost layer of the protection for Delhi. It was reported that a combination of different weapons like Stinger surface-to-air missiles, gun systems and AIM-120C-7 AMRAAMs (advanced medium-range air-to-air missiles), backed by three-dimensional Sentinel radars, fire-distribution centres and command-and-control units would constitute the entire system.

In the place of NASAM=II the IAF has shown a preference to pursue the locally built two-tier ballistic missile defence (BMD), comprising of advance air defence (AAD) and Prithvi air defence (PAD) interceptor missiles.

In addition to this significant support to a local development program the IAF has also placed orders for a large number of another make in India success story - the Akash SAM systems.

With seven new squadrons ordered and earlier inductions of at-least eight squadrons the IAF will see a minimum of 15 Akash SAM squadrons in service. Each squadron is likely to require 125 Akash missiles.

According to Livefist, it is yet unclear as to whether the government will go by the IAF's recommendation or if the purchase will go through as yet another Indian engagement of US military industrial complex.

In recent times the Indian armed forces have purchased significant amount of military hardware from the US. These include P-8i maritime patrol aircraft, MH-60R Romeo helicopters for the Indian Navy, Apache and Chinook helicopters.

The most recent purchase from the US was that of 72,000 Sig Sauer assault rifles. The current order follows an earlier order of a similar number of rifles for the army.

<https://www.defencenews.in/article/IAF-Indicates-It-Does-Not-Want-US-Made-NASAMS-II-Missile-System,-Prefers-Made-In-India-BMD-Set-Up-891734>



## IAF indicates it does not want U.S. made NASAMS-II missiles, Prefers made in India BMD system

By Shiv Aroor

It's official: The Indian Air Force doesn't want the American NASAMS-II networked air defence system and has communicated this to the government. Pitched to India since 2017 in the wake of India's decision to procure the Russian S-400 Triumph, Livefist has learnt that the Indian Air Force has informed the government that it would rather spend resources on the indigenous multi-tiered Ballistic Missile Defence (BMD) program that includes medium and long range surface-to-air missile elements. The latter system has completed the first phase of its development and is currently part of plans for operational deployment by 2022.

That said, it is unclear if the IAF's word will impact active ongoing India-US negotiations to acquire the NASAMS-II system. The Indian government kickstarted the procurement process in 2018,



The 'Pradyumna' Prithvi Defence Vehicle (PDV) & 'Ashwin' Air Defence (AAD) interceptors

with the MoD according acceptance of necessity (AoN) for a NASAMS-II based 'Integrated Air Defence Weapon System' for the Delhi region, even though it isn't strictly an anti-missile system. A steep dollar price tag — nearly double the \$1 billion budgeted by India for the procurement — has slowed progress.

While the IAF had communicated its opinion on the NASAMS-II earlier this year, it is unclear if it will see things differently following the near-war situation that has bristled on the China border in Ladakh for over two months. What definitely hasn't changed is the IAF's support to the Indian BMD program. It must be said that the NASAMS-II and Indian BMD are not directly interchangeable. While the NASAMS-II is an air defence system designed to target aircraft and cruise missiles, the BMD system targets incoming ballistic missiles.

India's ballistic missile defence (BMD) program, which began development two decades ago, is reported to be ready for deployment in a configuration for India's national capital territory, with future phases to fine-tune and expand capabilities. At present, the BMD system includes the endo-atmospheric Advanced Air Defence (AAD) interceptor and the exo-atmospheric Prithvi Air Defence (PAD) systems. The IAF has pledged full support to the Indian BMD program and the necessary logistics to see it roll into operational service on time.

While the IAF's view the NASAMS-II is crucial and may support concerns over the price of the system, it may not ultimately stall an acquisition. Like several items of military hardware, the NASAMS-II wasn't pitched to meet a specific Indian requirement, but rather an offer made in the wake of India's decision to buy five regiments of the Russian S-400 air defence missile system, the first of which arrive in India late 2021.

In that sense, the NASAMS-II is very much chess piece in the larger strategic game between the U.S. and Russia with India as the battlefield. Following the S-400 deal, India was able to successfully navigate possible punitive actions under the Trump Administration's Countering America's Adversaries Through Sanctions Act (CAATSA) through sustained diplomacy undoubtedly sweetened with the reminder of the near non-stop list of armament contracts awarded to US companies in the last decade. Agreeing to consider the NASAMS-II was very much part of this India-US interplay.



Russia has separately been lobbying hard against India's decision to even consider the NASAMS-II. In August 2018, Dmitri Shugaev, chief of Russia's Federal Service of Military-Technical Cooperation (FSMTC) told Livefist, "We don't see any need for India to buy NASAMS from U.S. as S-400 provides umbrella cover." That, again, assumes that the NASAMS-II campaign is anchored in a staff requirement.

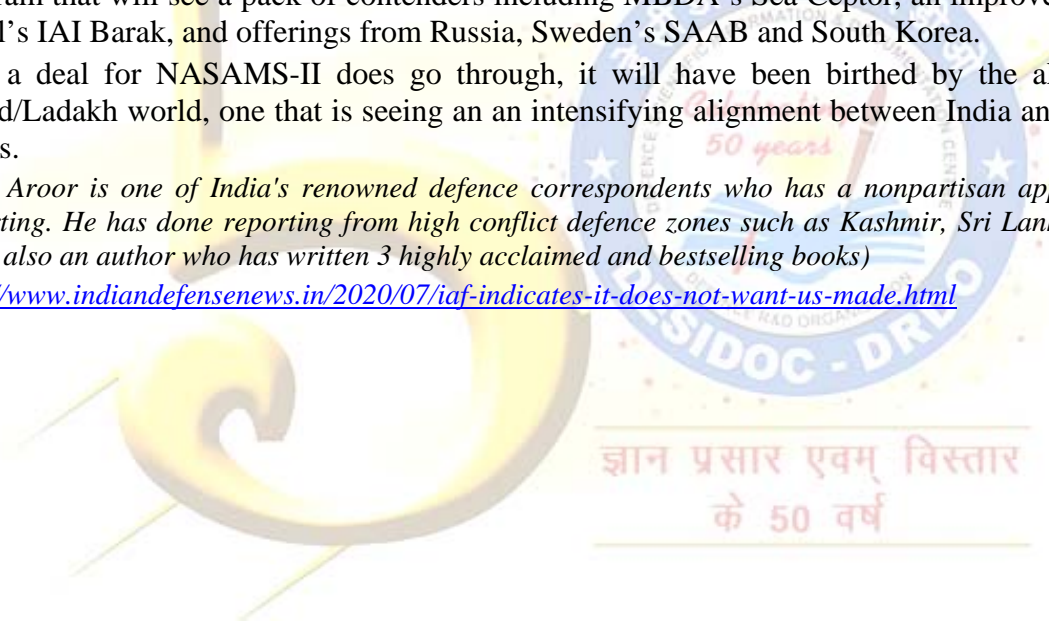
The NASAMS-II isn't the first integrated air defence system that's been pitched to India. Starting in 2004-05, the George W. Bush administration pushed a layered ballistic missile defence system to India comprising the endo-atmospheric Patriot PAC-3 and the exo-atmospheric THAADs (terminal high altitude air defence system). While India had a steady supply of Russian equipment for far longer than its renewed relationship with the US, choosing the S-400 was an especially violent jolt to Washington given the S-400's reputation and its controversial role in the larger air defence interplay in the region.

The question at hand, now, is if the government will continue with plans to acquire the NASAMS-II or use cost concerns and the IAF's reservations as leverage to push back. The truth also is that the dynamic has changed overwhelmingly in the last five months. The brink-of-war standoff between India and China in eastern Ladakh since May has turned several pre-standoff perceptions and views on their head. The impact on defence acquisitions and planning is clear to see, with a familiar flood of procurements now jostling for 'fast track' priority. Interestingly, the slew of new purchase efforts includes new air defence weaponry from Israel. Last year, the Indian Navy kickstarted a contest to choose new air defence missile weaponry for its future warships, a program that will see a pack of contenders including MBDA's Sea Ceptor, an improved version of Israel's IAI Barak, and offerings from Russia, Sweden's SAAB and South Korea.

If a deal for NASAMS-II does go through, it will have been birthed by the all new post-Covid/Ladakh world, one that is seeing an intensifying alignment between India and the United States.

*(Shiv Aroor is one of India's renowned defence correspondents who has a nonpartisan approach to his reporting. He has done reporting from high conflict defence zones such as Kashmir, Sri Lanka and Libya. He is also an author who has written 3 highly acclaimed and bestselling books)*

<http://www.indiandefensenews.in/2020/07/iaf-indicates-it-does-not-want-us-made.html>



ज्ञान प्रसार एवम् विस्तार  
के 50 वर्ष



TIMESNOWNEWS.COM

Wed, 22 July 2020

## IAF commanders' 3-day meet begins today; India-China border situation, deployment of Rafale jets on agenda

*In a strong message to China, IAF has been carrying out night time combat air patrols over the eastern Ladakh region*

New Delhi: As India and China are engaged in the disengagement process in eastern Ladakh, top commanders of the Indian Air Force (IAF) will meet on Wednesday to discuss the LAC situation. The IAF top brass is expected to deliberate on ways to enhance the air force's prowess along the de-facto border with China including in Arunachal Pradesh, Sikkim and Uttarakhand, sources said.

The high-level meeting is also expected to discuss the deployment of the first batch of Rafale fighter jets in the Ladakh sector. Notably, at least six of 36 Rafale fighter aircraft are likely to join the IAF by July-end.

The 3-day meet, which will be headed by Air Chief Marshal RKS Bhadauria, will discuss in detail the country's air defence system and also carry out an in-depth review of it.

"The commanders will also review the evolving security architecture in the region and ways to boost IAF's combat capability," PTI quoted a source as saying.

Defence Minister Rajnath Singh is also expected to meet the IAF commanders.

In a strong message to China, IAF has been carrying out night time combat air patrols over the eastern Ladakh region. IAF has deployed Sukhoi 30 MKI fighter jets, Jaguar and Mirage 2000 aircraft in key frontier air bases in the eastern region to challenge any Chinese aggression.

Besides deploying Apache attack choppers, the IAF has also pressed into service a fleet of Chinook heavy-lift helicopters C-17 Globemaster III transport aircraft and C-130J Super Hercules to ensure quick delivery of military equipment to forward bases.

Meanwhile, reports have emerged that Indian Navy's MiG-29K fighter jets will be deployed in the northern sectors along the LAC.

Indian and Chinese armies have been locked in a bitter border standoff in eastern Ladakh since early May this year. The tension between the two nuclear-powered nations escalated after the deadly Galwan clash in which the Indian Army lost its 20 brave soldiers.

In an attempt to mend the relations amid the heightened tension due to the border buildup along the LAC by both the countries, National Security Advisor Ajit Doval and Chinese State Councillor and Minister of Foreign Affairs Wang Yi had a telephonic conversation on July 5.



Sukhoi 30 MKI fighter jet | Photo Credit: IANS

Both the leaders agreed “maintenance of peace and tranquillity in the India-China border areas was essential for the further development of bilateral relations” between the two nations.

Following the talks, China and India started the disengagement process in the first step towards de-escalation of border tensions.

<https://www.timesnownews.com/india/article/indian-air-force-iaf-meet-rafale-fighter-jets-india-china-border-ladakh-rks-bhadauria/625214>



Wed, 22 July 2020

## Ladakh: Chinese positions unchanged since last Corps Commanders meet, says officer

*The status of Chinese force disengagement along the Line of Actual Control in Eastern Ladakh remain unchanged since the last Corps Commanders meeting for second phase of disengagement*

*By Mayank Singh*

New Delhi: The status of Chinese force disengagement along the Line of Actual Control in Eastern Ladakh remain unchanged since the last Corps Commanders meeting for second phase of disengagement. But, the Indian side is hopeful that Chinese troops will move back.

A senior Army officer told, “The Chinese positions have not changed since the last meeting between the Corps Commanders.”

The Chinese troops had moved back from the standoff positions from Patrolling Points (PP) 14 and 15. But they did not move back from Hot Spring. Also, the Chinese moved out of the Finger 4 height but remain positioned on the ridges. Further, the standoff at Y-Junction, Depsang remains as it is.

But, the Army is hopeful that the Chinese will move back. “During the first phase of disengagement, after the meeting on June 30 the Chinese troops had moved out only during the last two days of the time set for retreat from the standoff points.” added the officer, asking not to be named.

The troops of India and China are in standoff position since the intervening night of May 5 and 6 when the Chinese soldiers clashed with the Indian Army troops at Finger 4. After the Clash the Chinese moved in their troops at PP 14, 15 and 17A in addition to the Finger 4 on the Northern flank of the Pangong Lake. Later, Chinese also deployed their large body of troops at Y Junction, Depsang.

Indian Army has deployed its troops commensurate with the Chinese deployment along with the armoured and the artillery. Also, the Air Forces of both countries have positioned their assets to react in case of need. Indian Air Force has moved forward its frontline Combat aircrafts like the Sukhoi 30, Mirage 2000, MiG 29 and Apache.

<https://www.newindianexpress.com/nation/2020/jul/21/ladakh-chinese-positions-unchanged-since-last-corps-commanders-meet-says-officer-2172920.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. (Photo | AP)

## Four sub-killer P-8I craft coming to India next year, then talks for six more

*The Indian Navy variant of the P-8A Poseidon - P-8I where I stands for India - is essentially designed for maritime patrol. Integrated with the Harpoon Block II air launched missiles and lightweight torpedoes, the reconnaissance craft - it can carry 129 sonobuoys to locate subs - turns into a deadly submarine killer that can also launch anti-ship missiles*

By Shishir Gupta

New Delhi: India's long-range anti-submarine, reconnaissance, surveillance and electronic jamming capabilities in the Indian Ocean Region are going to get a further boost with the induction of four more P-8I multi-mission aircraft from the US next year. India has the option of buying another six from Boeing to be negotiated later in 2021, people familiar with the developments in New Delhi and Seattle said.

The Indian Navy variant of the P-8A Poseidon - P-8I where I stands for India - is essentially designed for maritime patrol. Integrated with the Harpoon Block II air launched missiles and lightweight torpedoes, the reconnaissance craft - it can carry 129 sonobuoys to locate subs - turns into a deadly submarine killer that can also launch anti-ship missiles.



The proposed acquisitions come against the backdrop of China's efforts to militarise the South China Sea and expand its sea footprint.

Beijing had already acquired a string of ports in Myanmar, Sri Lanka, Pakistan, Iran and east Africa to not only contain the Indian Navy but also challenge the presence of US Central Command forces as well as French and British Navy.

Beijing has 70 percent stake in Kyaukpyu port in Myanmar, which sits in the Bay of Bengal, Hambantota port in South Sri Lanka dominates the Indian Ocean, Gwadar port in Pakistan sits on the mouth of Gulf of Oman and the port of Jask in Iran is located on the edge of Persian Gulf.

National security planners believed that the possibility of China attempting to replicate its aggressive posture along the Line of Actual Control at a time of its choosing in the Indian Ocean Region was very real, a government official said.

India also inched closer to formalising the anti-China QUAD - Quadrilateral Security Dialogue - strategic grouping. The United States, Japan and Australia are the other members.

In some measure, the QUAD is already a reality on the high seas due to India signing the Communications, Compatibility and Security Agreement (COMCASA) agreement in September 2019. The P-8I helped.

The pact provided the legal framework for exchange of encrypted communication. P-8I makes this possible with ease, particularly since the aircrafts are interoperable, can communicate securely and is designed for .

"This is a de-facto QUAD because these have interoperability with the P-8A Poseidon delivered to other countries," said the official.

The secure communications enables one aircraft to share real-time operational intelligence, including a Common Tactical Picture with other P-8 aircraft.

The P-8I aircraft is designed for long-range anti-submarine warfare, anti-surface warfare, and intelligence, surveillance and reconnaissance missions. It operates with joint and combined

The purchase of six P-8I was cleared by the Defence Acquisition Council in November 2019, long before the stand-off with an aggressive China along the Line of Actual Control in Ladakh. (Sourced)



But it can be used elsewhere too. The military had relied on the reconnaissance aircraft for surveillance during the ongoing Ladakh standoff with China as well as the 2017 Doklam standoff.

It has a range of about 2,200 km and flies at a maximum speed of 490 knots, or 789 km per hour.

The negotiations for the purchase of six more P-8I aircraft are yet to begin, a government official in New Delhi said. The purchase of six P-8I was cleared by the Defence Acquisition Council in November 2019, long before the stand-off with an aggressive China along the Line of Actual Control in Ladakh.

<https://www.hindustantimes.com/india-news/four-sub-killer-p-8i-crafts-coming-to-india-next-year-then-talks-for-six-more/story-Y7jNhu6lZHU4dF2SXraU8M.html>

## THE TIMES OF INDIA

Wed, 22 July 2020

# Amid border row with China, Navy's MiG-29K fighter aircraft to be deployed in northern sector

New Delhi: At a time when Indian Navy's P-8I surveillance planes are carrying out frequent sweeps over the eastern Ladakh sector, the Navy's maritime fighter jets MiG-29K will be deployed in the Northern sector for operations.

The deployment of the naval fighter aircraft at the Indian Air Force (IAF) bases is in line with Prime Minister Narendra Modi's directives for enhancing jointness between the three services and Chief of Defence Staff General Bipin Rawat's call for the possibility of deployment of maritime combat aircraft along the northern or western borders with the Air Force.

"It is being planned to deploy the MiG-29K fighter aircraft at an Indian Air Force base in the northern sector. They might be used for carrying out operational flying in the Eastern Ladakh sector along the Line of Actual Control (LAC)," government sources told ANI.

The Indian Navy has a fleet of over 40 MiG-29K fighter jets that are deployed on the aircraft carrier INS Vikramaditya and carry out regular flying from the naval fighter base INS Hansa in Goa.

The Russian-origin fighters were procured by the Indian Navy along with the aircraft carrier over a decade ago.

Amid the ongoing dispute with the Chinese People's Liberation Army (PLA), the Indian Navy has been playing an important role as its planes are being used for surveillance along the LAC for picking up the Chinese activities and positions there.

The surveillance aircraft were used extensively during the Doklam crisis as well. The Indian Navy is also carrying out an exercise close to the Malacca Straits from where the Chinese Navy enters into the Indian Ocean Region.

"The warships and submarines of the Western Fleet are carrying out wargames near the Andaman and Nicobar Islands territories as part of their deployment," government sources said.

The nuclear submarines, including the INS Chakra and INS Arihant, are also out of their harbours, they added.

Aircraft carrier INS Vikramaditya has also been out in the sea for missions with its carrier battle group. The Indian Navy has been keeping a constant eye on the activities of the Chinese Navy in the Indian Ocean Region where they come regularly with their warships including Landing Platform Docks and long-range frigates and destroyers.





Indian Navy warships also carried out a passage exercise with the American aircraft carrier USS Nimitz a few days ago amid tensions with China.

<https://timesofindia.indiatimes.com/india/amid-border-row-with-china-navys-mig-29k-fighter-aircraft-to-be-deployed-in-northern-sector/articleshow/77088908.cms>



Wed, 22 July 2020

## चीनी सेना की गतिविधियों पर नजर रखने के लिए तैनात होंगे नौसेना के लड़ाकू विमान मिग-29 K

*चीन से तनाव के बीच नौसेना के समुद्री लड़ाकू जेट मिग-29 K को  
परिचालन के लिए उत्तरी क्षेत्र में तैनात किया जाएगा।*

नई दिल्ली: भले ही लद्दाख सीमा से भारत और चीन के सैनिक हट रहे हैं, लेकिन पुराने इतिहास के कारण चीनी सेना पर विश्वास करना कठिन है। यही कारण है कि भारतीय नौसेना के पी-8। निगरानी विमान पूर्वी लद्दाख क्षेत्र पर लगातार उड़ान भर रहे हैं, वहीं दूसरी ओर नौसेना के समुद्री लड़ाकू जेट मिग-29 K को परिचालन के लिए उत्तरी क्षेत्र में तैनात किया जाएगा।

प्रधानमंत्री नरेंद्र मोदी के निर्देशों के अनुरूप वायु सेना के साथ उत्तरी या पश्चिमी सीमा के साथ भारतीय वायुसेना (IAF) के ठिकानों पर नौसैनिक लड़ाकू विमानों की तैनाती तीनों सेनाओं और चीफ ऑफ डिफेंस स्टाफ जनरल बिपिन रावत के कहने पर समुद्री युद्धक विमानों की तैनाती की जा रही है।

सरकार के सूत्रों ने कहा कि यह उत्तरी क्षेत्र में भारतीय वायु सेना के बेस पर मिग -29 K लड़ाकू विमान को तैनात करने की योजना बनाई जा रही है। इनका उपयोग वास्तविक नियंत्रण रेखा (LAC) के साथ पूर्वी लद्दाख क्षेत्र में परिचालन उड़ान भरने के लिए किया जा सकता है। भारतीय नौसेना के पास 40 से अधिक मिग -29 K लड़ाकू विमानों का एक बेड़ा है, जो विमानवाहक पोत आइएनएस विक्रमादित्य पर तैनात हैं और गोवा में नौसेना के लड़ाकू विमान आइएनएस हंसा से नियमित उड़ान भरते हैं। रूसी मूल के लड़ाकू विमानों को भारतीय नौसेना द्वारा विमान वाहक के साथ एक दशक पहले खरीदा गया था।

### चीनी सेना पर रखी जाएगी नजर

चीनी पीपुल्स लिबरेशन आर्मी (PLA) के साथ चल रहे विवाद के बीच भारतीय नौसेना एक महत्वपूर्ण भूमिका निभा रही है, क्योंकि इसके विमानों का उपयोग एलएसी के साथ निगरानी के लिए किया जा रहा है, ताकि चीनी गतिविधियों और पदों को उठाया जा सके।

### डोकलाम संकट के दौरान भी तैनात किए गए थे निगरानी विमान

2017 में डोकलाम संकट के दौरान भी निगरानी विमानों का बड़े पैमाने पर इस्तेमाल किया गया था। भारतीय नौसेना मलक्का जलडमरूमध्य के पास एक अभ्यास भी कर रही है, जहां से चीनी नौसेना हिंद महासागर क्षेत्र में प्रवेश करती है। सरकारी सूत्रों ने कहा कि पश्चिमी बेड़े के युद्धपोतों और पनडुब्बियों को अंडमान और निकोबार द्वीप समूह के पास युद्धविराम दिया गया है। आइएनएस चक्र और आइएनएस अरिहंत सहित परमाणु पनडुब्बियां भी उनके बंदरगाह से बाहर हैं।

### चीनी नौसेना की गतिविधियों पर लगातार रखी जा रही है नजर

विमानवाहक पोत आइएनएस विक्रमादित्य भी अपने कैरियर युद्ध समूह के साथ मिशन के लिए समुद्र में गया है। भारतीय नौसेना हिंद महासागर क्षेत्र में चीनी नौसेना की गतिविधियों पर लगातार नजर रख रही

है, जहां वे अपने युद्धपोतों के साथ लैंडिंग प्लेटफॉर्म डॉक्स और लंबी दूरी के फ्रिगेट और विध्वंसक सहित नियमित रूप से आते हैं। भारतीय नौसेना के युद्धपोतों ने भी कुछ दिनों पहले चीन के साथ तनाव के बीच अमेरिकी विमानवाहक पोत यूएसएस निमित्ज के साथ अभ्यास किया था।

### जल्द ही राफेल को आपरेशनल मोर्चे पर लगाया जाएगा

वायुसेना इस बात की पूरी तैयारी कर रही है कि जल्द से फ्रांस से आने वाले 5 लड़ाकू विमान राफेल को आपरेशनल मोर्चे पर लगाया जाए। वायुसेना के बयान के मुताबिक, भारत पहुंचने के बाद 29 जुलाई को अंबाला एयर बेस पर मौसम के हिसाब से राफेल विमानों को वायुसेना में शामिल किया जाएगा। माना जा रहा है कि पूर्वी लद्दाख में चीन के साथ मौजूदा तनाव के मद्देनजर राफेल के पहले बेड़े को सबसे पहले यहां तैनात किया जा सकता है।

राफेल वायुसेना की मौजूदा ताकत में जबरदस्त इजाफा करेगा, क्योंकि पांचवीं जेनरेशन के इस लड़ाकू जेट की मारक क्षमता जैसा लड़ाकू विमान चीन और पाकिस्तान के पास नहीं हैं। वायुसेना के शीर्ष कमांडरों की 22-24 जुलाई को होने वाली कॉन्फ्रेंस में भारत की मौजूदा सुरक्षा चुनौतियों पर चर्चा के साथ राफेल जेट की रणनीतिक तैनाती पर भी चर्चा संभावित है।

<https://www.jagran.com/news/national-india-china-border-news-naval-fighter-aircraft-mig-29k-to-be-deployed-on-china-border-20537091.html>

THE TIMES OF INDIA

Wed, 22 July 2020

## Amidst India-China standoff, security agencies keeping close eye on Barahoti in U'khand

By Prashant Jha

Nainital: Even as India and China are engaged in a standoff in Ladakh, security agencies are keeping a close watch on Barahoti – a remote area in Uttarakhand's Chamoli district -- that has seen multiple Chinese incursions in the past few years.

Officials say that even though no Chinese incursion has been witnessed in the Barahoti area so far this year, a tight vigil is being maintained. "Our personnel are on the ground and keeping a close eye on the area. So far, the border has remained peaceful. We will continue to maintain tight vigil," said an official of the Indo-Tibetan Border Police (ITBP), which has its presence in Barahoti as well as the Mana Pass, adjoining the border with China.



Barahoti has been claimed by the Chinese as part of their territory since the 1950s. Though meetings were held between the Indian and Chinese side in 1954 to sort the issue, a consensus could not be reached and the territory has remained in dispute ever since.

Though the Chinese have crossed several times into the Barahoti sector, the incursions have increased in the last few years. In September 2018, Chinese soldiers were reported to have entered almost four km inside Barahoti. In July of the same year, PLA soldiers also had a face-off with local Garhwali shepherds here. And in the previous year, that is 2017, two helicopters suspected to have originated from China were spotted flying in Indian airspace at Barahoti. In 2014, too, Chinese Army choppers had entered into Indian airspace at Barahoti.

Explaining the importance of Barahoti, former Army officers said that the area is around 80 kilometer of pasture land surrounded by snow-capped mountains. "Because it is a prime pasture

land which remains accessible during the summers as compared to the nearby areas which are covered with snow, the PLA and the Chinese government are eyeing the area. It is therefore necessary that India should maintain strong vigil in the area,” said Lieutenant General Syed Ata Hasnain (retd). He added that even though Barahoti is smallest among the contested areas, it offers scope to the Chinese army to attempt coercion without investing much of their troops

<https://timesofindia.indiatimes.com/city/dehradun/amidst-india-china-standoff-security-agencies-keeping-close-eye-on-barahoti-in-ukhand/articleshow/77072523.cms>



Wed, 22 July 2020

## Rafale coming in! How Rafale fighter jets fare against the Chinese PLAAF fighters?

*The PAF had acquired the F-16 Fighting Falcons a couple of years before. This time around, with the induction of the Rafale, does the IAF need more than a catchy tag line to keep the PLAAF at bay?*

*By Wing Commander Amit Ranjan Giri*

“The balance rests on us”—this was the catchphrase of the IAF when the first MiG 29 thundered down and took to the skies in Pune, in the mid-eighties, heralding the parity in new generation fighter jets between the PAF and IAF. The PAF had acquired the F-16 Fighting Falcons a couple of years before. This time around, with the induction of the Rafale, does the IAF need more than a catchy tag line to keep the PLAAF at bay?



Rafale coming in! How Rafale fighter jets fare against the Chinese PLAAF fighters?

As Group Captain Harkirat and his boys land the latest fighting machines at Ambala, five in all, two twins seaters (RB series) and three single-seaters (BS series), they propel the IAF to another level of air fighting capability, one which would enhance itself with the acquisition of all 36 Rafales and associated weaponry in the near future. An interesting trivia about IAF fighters is that,



Russian fighters generally come in huge crates and are assembled in India whereas most 'western' fighters are flown in, from the OEM country. This, by no means, indicates that the incoming Rafales would be able to take on the enemy immediately, it would take the IAF a little time before these jets are operationalised with a plethora of weaponry, the earlier the better.

### **How does the Rafale fare against the Chinese fighters?**

The Rafales' main contender in the PLAAF would be the Chengdu J-20 and if produced and operationalised the Shenyang J-31, both are highly rated by the Chinese media and pitched as fifth-generation stealth fighters against the Rafales' 4.5 generation lineage. That having been said, the Chinese fighters' capabilities are only on paper, much of them are yet to be demonstrated or proven. True, the Rafale lacks stealth but is built around the low RCS philosophy whereas, though the J-20 proclaims itself as a proponent of stealth the 'canards' in front and additional external hardpoints for extra fuel tanks would shatter much of its claims in this department. Just to clear the air around stealth – absolute all aspect stealth is a myth, at least as of now. Aeroplanes claiming stealth are actually low observables depending on their aspect – the way they look to the enemy sensors- never invisible from all direction. The IAF has been known to pick up Chinese J-20s on their Su 30 radars earlier.

### **Engine, weapons and avionics: who gets the better score?**

With limited internal capacity of weapons and no 'supercruise' capability as yet, the Chinese contenders do have a lot to live up to. The Rafale, in this aspect, delivers what it promises – low RCS, excellent weapon carriage capability – albeit external and supercruise – the ability to go supersonic without afterburners. When it comes to avionics, all three aircraft would pitch 'neck to neck'. All boast of one of the most advanced radars – the Active Electronically Scanned Array (AESA) and all three have equivalent avionics suites onboard. However, it is yet to be seen if the Chinese have been able to integrate these technologies to match, compute and present the desired data – a capability which leapfrogs an aircraft to the next level. The Rafale's SPECTRA defensive aids system is a classic example of this – processing and amalgamating information from various sensors to safeguard the aircraft.

The SCALP and Meteor are some of the goodies in the Rafale package for the IAF. Whilst the former is a ground attack precision weapon, the latter, is one of the best BeyondVisualRange (BVR) air to air missiles available at present. The J-20 in comparison carries the PL series of missiles with the PL 15 matching up with the Meteor in terms of range. As per the last reports, the PL 21 with enhanced range was yet to be operationalised.

### **Pedigree versus Pariah, who wins?**

The Rafale comes from an ancestry of well-known fighters which Dassault has produced and earned their place in the annals of history. If western intelligence reports are to be believed the Chinese fighters have been an attempted copy of the F 22 Raptor and the F 35 Lightning, curtsy hackers who had managed to steal substantial amount of data from the US servers.

Apart from the privileged pedigree the Rafale is also combat-proven – Libya, Iraq and Syria were all contemporary conflicts wherein the French fighter has been able to earn a name for itself. The Chinese fighters, in contrast, are yet to be proven in battle, as far as the J-31 goes there are doubts if the machine has gone beyond the prototype stage as yet. The J-20, on the other hand, does enjoy an edge over its single-engined cousin, it has entered the production stage and rumours of about one squadron of this type with PLAAF has surfaced in the intelligence circle.

All the above being said it needs to be appreciated that no comparison of fighting machines can be justified with data on paper – a lot goes in exploiting platforms during the war and a major portion of the winning effort comes from other non-tangible factors – the side which exploits the entire spectrum generally lands up on the victorious side.

*(The author is Indian Air Force Veteran. Views expressed are personal.)*

<https://www.financialexpress.com/defence/rafale-coming-in-how-does-rafale-fighter-jets-fare-against-the-chinese-plaaf-fighters/2031381/lite/>



## To deal with the China threat that's looming on the LAC, revive the Mountain Strike Corps

*By Shankar Ghosh*

With China's current aggressive approach intended to dominate India militarily and politically, and the volatile situation in eastern Ladakh, New Delhi seems to have been caught on the backfoot. Over the years we have been lulled into complacency with the belief that military restraint along the LAC, coupled with a "peace and prosperity" approach, would result in a permanently harmonious environment between the two nations. Beijing has just proved everyone wrong.

We are a highly threatened nation, with two unpredictable and hostile governments and militaries focussed on keeping us destabilised with aggressive actions across our borders. In the larger interests and aspirations of our people, we need to keep both these countries in check.

There's an urgent need to review our military capabilities and options to ensure that not only are we prepared to stymie Beijing's territorial ambitions but also to carry out offensive operations beyond our borders. Simultaneously, we must also reassess futuristic threats in the Indian Ocean Region (IOR). As a major power in Asia, with so much at stake, we cannot remain passive in developing our defensive or strategic power projection capabilities.

The army has three strike corps for deep offensive operations into Pakistan. Ideally, two more strike formations are required for the mountains, one each for the Ladakh and the eastern borders. In 2013, the government sanctioned the raising of the 17 Mountain Strike Corps with two infantry divisions, two independent armoured brigades and strong combat support in the form of artillery, engineer, air defence and aviation brigades.

Unfortunately, the government did not allocate a separate budget for it. As a result the raising was halted in 2018, leaving a truncated force comprising the Corps HQ, one infantry division and certain other combat and combat support elements. This force was then further tinkered with by testing them as smaller integrated battle groups for offensive actions in the mountains. The current status and roles of 17 Corps remain ambiguous.

With the changed military scenario along the LAC, the need has come to revive 17 Corps so that it's organised, equipped and trained to undertake offensive operations soonest. At the outset, the Corps should be renamed 17 Corps (Strategic Operations) with the primary role of carrying out offensive operations in the mountains, and a secondary role in the IOR by detaching part of the Corps. While this may sound complex, with China also being the primary threat to our island assets and areas of interest in the IOR, we have no option but to train for multiple roles, just as some of our existing elements are dual tasked for operations on different borders.

That apart, with the likelihood of military alliances being formed with other nations in the Asia-Pacific region, it would be necessary for us to have a credible power projection force ready and prepared.

While currently we have to go along with standard infantry divisions as the strike elements of the Corps, in the long run we will have to raise airborne and air transported infantry brigades comprising special forces battalions, parachute battalions and Ladakh and Arunachal Scouts (Para) units. Apart from the normal combat support elements, the strike divisions would need integrated airlift capabilities, as also special elements like Apache and Chinook helicopter flights, UAV/drone units etc. The army will also need to carry out a holistic review of the role and employment of our forces meant for the western borders, and rebalance and reallocate these resources to prepare for future wars.

It would be necessary to create habitat and logistical support to locate major elements of both divisions in Ladakh and Arunachal Pradesh. All special forces/ parachute/ infantry battalions

should be permanently affiliated to the Stratops Corps to develop domain specialisation, as also to ensure that major elements remain acclimatised and trained for high altitude operations at all times.

Now that we have seen the ominous territorial plans of China, “guns or butter” will have to settle down to a “guns and butter” compromise by reprioritising all major and minor government schemes, cutting out wasteful expenditure on non-essentials and ceremonials, reducing the vast manpower of central and state governments and strict fiscal discipline. The army may also have to reduce some of our high cost, equipment oriented units in the west to provide the budgetary requirement for the Stratops Corps.

*(Disclaimer: Views expressed above are the author's own.)*

<https://timesofindia.indiatimes.com/blogs/toi-edit-page/to-deal-with-the-china-threat-thats-looming-on-the-lac-revive-the-mountain-strike-corps/>

# ThePrint

Wed, 22 July 2020

## India designed two-front war theory to draw US' economic, diplomatic and military support

*In case of simultaneous threat from Pakistan and China, Gen Rawat, who is also India's first CDS, had said there would be a primary and a secondary front*

*By Muhammad Ali Siddiqi*

Are they really serious when successive Indian army chiefs say they are preparing for a two-front war? Or is a two-front war merely a bogey to attract sympathy from the right quarters? The more important question is: does India really consider China an enemy and does it really have the stomach or the desire to fight China? The June 15 clash clearly shows India will do anything to appease China.

Yet, astonishing as it sounds, while flaunting their ambitious plans for a two-front war, the current army chief and his predecessor give themselves away when they declare that the focus of their war preparations is basically Pakistan and that on the Chinese front the Indian army will adopt a policy of deterrence.

In his first press conference after taking over as army chief last December, Gen Manoj Mukund Naravane spoke of “collusivity” between Pakistan and China and said this could be “both physical on land borders and in other spheres also” as in technology and “in coming to each other’s help in times of trouble”. This “collusivity” between two of India’s neighbours, he said, was “maximum” around the Siachen glacier and Shaksgam valley. For that reason, he said, it was important to “keep that area in our possession” because Pakistan was waging a “proxy war” on India, while China was “flexing its muscles”.

For those perceived threats, India’s war plans are ambitious and include, besides road and rail infrastructure and tunnelling, a new mountain strike corps — 17th — consisting of 100,000 men. This corps will be so located that it can be deployed on both the western (Pakistan) and northern fronts (China).

On the army’s strategy for the border with China, Gen Naravane explained: “We have to balance out our requirements and deployments to cater for both west and north. For the northern frontiers, we are going for capacity building, which includes building roads to forward areas, habitats, storage for ammunition and moving some of our advanced weapons system to [the] eastern side. In a way of balancing out we can meet a threat from any direction. As a result of this rebalancing, we are now prepared for this challenge.”



CDS Gen Bipin Rawat | Photo: Praveen Jain | ThePrint.in

The general then reaffirmed what Gen Bipin Rawat, his predecessor, had said with regard to the truth about the two-front war. In an interview with the Times of India, Gen Rawat, appointed army chief in December 2016, said: “The two-front is a real scenario. Much has changed from before in terms of our capabilities ... the army, navy and IAF are now jointly very much prepared for such an eventuality.” Apart from the development of Agni IV and Agni V nuclear capable ballistic missiles, he said, the forces have taken a series of steps to slowly but surely transform the “dissuasion” posture against China into “deterrence”, which in turn is now being upgraded to “credible deterrence”.

Then he revealed what truly reflects the mindset and strategic thinking of India’s civil and military leadership. In case there are simultaneous threats from Pakistan and China, Gen Rawat, who is also India’s first chief of defence staff, said there would be a primary front and a secondary front. “The bulk of our forces and resources will be concentrated on the primary [Pakistan] front. On the other front, we will adopt a more deterrent posture, so that we are not found wanting”.

While the new corps (consisting of two high-altitude divisions) would have “quick reaction, ground offensive capabilities”, he made clear that India wanted cooperation not conflict with China. But, where Pakistan was concerned, he said in a talk at CLAWS, a military think tank, “we do not see any scope for reconciliation”.

The truth is India will never commit suicide by taking on China for America’s benefit, the two-front theory designed basically to get as much economic, diplomatic and military support as American naivety would allow.

Will India concede more territory to China? Yes because India has already written off Aksai Chin, which it once claimed. Today, a strategic highway linking Xinjiang to Tibet runs through Aksai Chin. Aware of Chinese sensitivity, New Delhi doesn’t even raise this issue because it knows Beijing is not going to talk about it. Thus when India talks of a border dispute with China, it only refers to the eastern border.

As the fate of arbitration after the Rann of Kutch clashes shows, India will concede a mile to China but it will not give an inch to Pakistan. In brief, America must know India has no desire to destroy itself for Pentagon’s pleasure. The two-front hoax is meant to squeeze the milch cow that is America. As its 2003 invasion of Iraq shows, Washington spent trillions of dollars for Israel’s benefit. Why wouldn’t America do the same in South Asia?

*(The writer is Dawn’s Readers’ Editor and an author. Views are personal.)*

<https://theprint.in/opinion/india-designed-two-front-war-theory-to-draw-us-economic-diplomatic-and-military-support/465414/>



## China common worry, India and US step up military, intel ties

*After US Secretary of State Michael R Pompeo spoke to External Affairs Minister S Jaishankar in the third week of June, at least two high-level phone conversations, key to this cooperation, have taken place*

*By Shubajeet Roy*

New Delhi: The two countries have been working quietly to step up information sharing amid the tense military standoff between Indian and Chinese troops — it has been on for 11 weeks now — along the Line of Actual Control in Ladakh.

After US Secretary of State Michael R Pompeo spoke to External Affairs Minister S Jaishankar in the third week of June, at least two high-level phone conversations, key to this cooperation, have taken place.

The Indian Express has learnt that National Security Advisor Ajit Doval spoke to US counterpart Robert C O'Brien while Chairman of the Joint Chiefs of Staff General Mark A Milley and Chief of Defence Staff General Bipin Rawat have had a conversation in the last few weeks.

These conversations have facilitated information-sharing between security, military and intelligence branches of the two countries.

On Monday, the USS Nimitz and warships of the Indian Navy conducted exercises designed to maximise training and interoperability, including air defence. The Nimitz Carrier Strike Group, the US Navy said, is currently deployed in the Indian Ocean in support of a free and open Indo-Pacific.

Sources said the phone conversation between Pompeo and Jaishankar really set the stage and gave a political push to the already existing security cooperation apparatus in place. Also, Defence Secretary Mark T Esper had called up Defence Minister Rajnath Singh in the second week of July.

The cooperation includes sharing of high-end satellite images, telephone intercepts, and data sharing of Chinese troops and weapons deployment along the entire stretch of the Line of Actual Control. New Delhi, sources said, is watching Chinese movements in “all sectors” of the LAC.

US equipment too has enhanced the capability of the Indian defence establishment. The Indian armed forces are using at least five American platforms in eastern Ladakh: C-17 Globemaster III for military transport, Chinook CH-47 helicopters in the heavy-lift category, the AH-64E Apache attack helicopters which also provide combat cover Army strike corps, P-8I Poseidon for overland reconnaissance, and the C-130J Super Hercules which are essentially tactical airlift transport and special operations aircraft.

On July 5, The Indian Express reported that Pompeo had spoken to Jaishankar after the incident in Galwan Valley where 20 Indian Army personnel were killed in clashes with Chinese troops.

Indian and the US did not make the call public for “strategic reasons” since Delhi and Beijing were engaged in diplomatic and military talks around that time.

<https://indianexpress.com/article/india/india-united-states-china-s-jaishankar-6517375/>



US Secretary of State Michael R Pompeo and External Affairs Minister S Jaishankar. (File photo)

## India-US naval drill shows ability to project power with allies, says US defence secretary

By Indrani Bagchi

New Delhi: US defence secretary Mark Esper said America was “closely monitoring” the India-China stand-off and the disengagement process on the Line of Actual Control (LAC).

In his virtual address to the International Institute of Strategic Studies, a global think-tank, Esper also said the USS Nimitz-Indian Navy exercises “shows US ability to project power in the Indian Ocean, and to sustain it with our allies and partners”.

The Indian Navy’s maritime drill with the US carrier strike group has been interpreted as signalling America’s intention of standing by India in its bid to resist China’s aggression on the LAC.

Describing the India relationship as “one of the all-important defence relationships of the 21st century”, Esper said India and the US would hold their ‘2+2’ dialogue between foreign and defence ministers later this year. Indian government sources said there was a plan for Esper to visit India around October. This year, it’s the turn of US secretary of state Mike Pompeo and Esper to make the trip to India, but between Covid-19 and the US polls, dates have not been fixed yet, sources here said.

Days after the US aligned its position on sovereignty in the South China Sea with the 2016 arbitral award by UNCLOS, Esper outlined the US’s Indo-Pacific strategy and said, “Three pillars of the US Indo-Pacific strategy are based on preparedness, strengthening partnerships and promoting a more networked region.” He added that the US was “encouraging Indo-Pacific nations to expand their own intra-regional security ties and networks of like-minded partners”, highlighting the India-Australia logistics sharing pact signed in June.

<https://timesofindia.indiatimes.com/india/india-us-naval-drill-shows-ability-to-project-power-with-allies-says-us-defence-secretary/articleshow/77096408.cms>

ज्ञान प्रसार एवम् विस्तार  
के 50 वर्ष

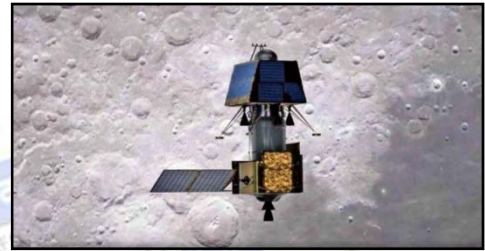
### Chandrayaan-2 data to be released globally from Oct: ISRO

*Extensive data has been acquired from Chandrayaan-2 payloads and parameters are being derived for presence of water-ice in the polar regions*

Chennai: The Indian space agency on Tuesday said the public release of science data from Chandrayaan-2 for global use will begin in October.

The Indian Space Research Organisation (ISRO) also said Tuesday marked a year of the launch of India's second moon mission by a Geosynchronous Satellite Launch Vehicle (GSLV)-MkIII-M1.

It was on July 22, 2019, the GSLV rocket, nicknamed 'Bahubali', blasted off from the second launch pad at India's rocket port in Sriharikota in Andhra Pradesh.



Vikram Orbiter

Extensive data has been acquired from Chandrayaan-2 payloads and parameters are being derived for presence of water-ice in the polar regions, X-ray based and infrared spectroscopic mineral information, and mid and high-latitude presence of Argon-40, a condensable gas on the Moon which gets released internally by the radio-active decay, said ISRO.

The report on the major findings from Chandrayaan-2's science experiments was planned to be released at the Annual Lunar Planetary Science Conference in March. However, it got cancelled due to Covid-19.

The Chandrayaan-2 spacecraft was inserted into lunar orbit on August 20, 2019.

All eight payloads on Chandrayaan-2 are performing well. The global mapping of lunar surface and polar coverage are being carried out as per the mission plan, ISRO said.

<https://telanganatoday.com/chandrayaan-2-data-to-be-released-globally-from-oct-isro>



## Specialized cellular compartments discovered in bacteria

*Discovery of bacterial 'organs' could pave the way for a new generation of antibiotics*

### Summary:

**Researchers have discovered bacterial organelles involved in gene expression, suggesting that bacteria may not be as simple as once thought. This finding could offer new targets for the development of new antibiotics.**

Researchers at McGill University have discovered bacterial organelles involved in gene expression, suggesting that bacteria may not be as simple as once thought. This finding could offer new targets for the development of new antibiotics.

The study, published in *Proceedings of the National Academy of Sciences*, is the first to show that *E. coli* uses similar strategies to regulate gene transcription as other more complex cell types.

Just like the human body is made up of organs that perform specialized functions, individual cells contain specialized compartments -- such as energy-producing mitochondria -- called organelles. Complex cells contain many different organelles, most of which are enclosed by a membrane that holds them together. Because bacteria do not have membrane-bound organelles, they were assumed to lack them altogether.

Stephanie Weber, an assistant professor in McGill's Department of Biology, and her team are the first to show that bacteria do in fact have such specialized compartments.

"Our paper provides evidence for a bacterial organelle that is held together by "sticky" proteins rather than a membrane," says Weber, who is the study's senior author.

The bacterial organelles described in the study are formed in a similar fashion to membraneless cellular compartments found in more complex eukaryotic cells (cells with a nucleus) through a process called phase separation, the same phenomenon that causes oil and vinegar to separate in salad dressing.

"This is the first direct evidence of phase separation in bacteria, so it may be a universal process in all cell types, and could even have been involved in the origin of life," explains Weber.

Because of the small size of the bacterial cells they were studying, Weber's team used an imaging technique -- photo activated localization microscopy -- to track the organelle-forming proteins.

Weber is now trying to understand exactly how the proteins assemble into organelles. Because they're involved in the first steps of gene expression -- transcription -- she believes they might also be an interesting target for the development of a new generation of antibiotic drugs, which are urgently needed to combat drug resistance.

### Story Source:

[Materials](#) provided by [McGill University](#). Note: Content may be edited for style and length.

### Journal Reference:

1. Anne-Marie Ladouceur, Baljyot Singh Parmar, Stefan Biedzinski, James Wall, S. Graydon Tope, David Cohn, Albright Kim, Nicolas Soubry, Rodrigo Reyes-Lamothe, Stephanie C. Weber. **Clusters of bacterial RNA polymerase are biomolecular condensates that assemble through liquid-liquid phase separation.** *Proceedings of the National Academy of Sciences*, 2020; 202005019 DOI: [10.1073/pnas.2005019117](https://doi.org/10.1073/pnas.2005019117)

<https://www.sciencedaily.com/releases/2020/07/200720103324.htm>

## New research reveals antifungal symbiotic peptide in legume

*Findings pave the way for developing environmentally friendly fungicides*

### **Summary:**

***Scientists have identified a sub class of peptides in the nodules of the legume, Medicago truncatula that proved effective in inhibiting growth of the fungus causing gray mold.***

Fungal diseases cause substantial losses of agricultural harvests each year. The fungus *Botrytis cinerea* causing gray mold disease is a major problem for farmers growing strawberries, grapes, raspberries, tomatoes and lettuce. To mitigate the problem, they often resort to applying chemical fungicides which can lose their effectiveness over time. Danforth Center scientists, Dilip Shah, PhD, research associate member, Siva Velivelli, PhD, postdoctoral associate, Kirk Czymmek, PhD, principal investigator and director, Advanced Bioimaging Laboratory and their collaborators at the Pacific Northwest National Laboratory have identified a sub class of peptides in the nodules of the legume, *Medicago truncatula* that proved effective in inhibiting growth of the fungus causing gray mold. The results of their research, Antifungal symbiotic peptide NCR044 exhibits unique structure and multifaceted mechanisms of action that confer plant protection, were recently published in the journal, *Proceedings of the National Academy of Sciences*.

"We are excited about the possibility of developing this class of peptides as a spray-on fungicide that would provide farmers with an environmentally friendly alternative to chemical fungicides for pre- and post-harvest management of fungal diseases," said Dilip Shah. "When applied to crops, the peptides will eventually break down to amino acids in the soil and be used by beneficial microbes as an energy source."

*Medicago truncatula* is a relative of alfalfa. Shah and his team produced recombinantly large quantities of the highly charged NCR044 peptide that is expressed in the nodules of this legume. They then applied the peptide in low concentrations to tobacco and tomato plants in the lab and challenged the plants with the gray mold fungus. The plants showed significant protection from this fungal disease.

To understand the antimicrobial mechanism within the cell, they collaborated with Czymmek, who is also a mycologist and has studied fungal cell biology for many years. Using time-lapse confocal and super resolution microscopy, the team was able to observe dynamically how the peptide binds to fungal spores and germlings, how it is internalized and where it goes inside the fungal cell. One key finding here was the confirmation that the peptide concentrated in the nucleolus, the organelle where ribosomal assembly takes place.

"It was a pleasure to work with Dilip and his team. As a young scientist, Siva, was able to move diligently across a very diverse set of platforms and techniques, following-up on leads from the scientific data. Ultimately, he was able to apply these corroborating techniques and uncover significant new information to create robust conclusions about the research project," said Czymmek, "It was really great science."

The unique team of scientists with expertise in fungal and plant cell biology combined with advanced imaging capabilities allowed them to make critical interpretations and confirm their hypotheses. Their collaborator and co-author on the paper, Garry Buchko, PhD at the Pacific Northwest National Laboratory solved the first three-dimensional structure of a nodule-specific peptide revealing a largely disordered, and highly dynamic, peptide structure containing a short anti-parallel  $\beta$ -sheet, tiny  $\beta$ -helix, and when oxidized, two stabilizing disulfide bonds.

A portion of the project was funded by TechAccel. Shah and Czymmek will continue their research and have applied to the National Science Foundation for a grant to further explore how antifungal nodule-specific peptides kill harmful fungal pathogens in vitro and in planta.

**Story Source:**

[Materials](#) provided by [Donald Danforth Plant Science Center](#). Note: Content may be edited for style and length.

**Journal Reference:**

1. Siva L. S. Velivelli, Kirk J. Czymmek, Hui Li, Jared B. Shaw, Garry W. Buchko, Dilip M. Shah. **Antifungal symbiotic peptide NCR044 exhibits unique structure and multifaceted mechanisms of action that confer plant protection.** *Proceedings of the National Academy of Sciences*, 2020; 117 (27): 16043 DOI: [10.1073/pnas.2003526117](https://doi.org/10.1073/pnas.2003526117)

<https://www.sciencedaily.com/releases/2020/07/200720103320.htm>



Wed, 22 July 2020

## Researchers discover new chemistry of 2-D transition metal carbides and carbonitrides

By Delia Croessmann

A new finding about the fundamental chemistry of two-dimensional materials called MXenes will change the way researchers work with them, and open up new areas of applications, according to researchers at Missouri S&T.

MXenes are ceramics that make up one of the largest families of 2-D conductive materials. Their conductivity makes them candidates for use in energy storage, sensing, and optoelectronics. According to the nanosciences information portal Nanowerk, what makes MXenes so interesting is that the materials could conceivably consist of any of millions of possible arrangements of transition metals (like molybdenum or titanium), carbon and nitrogen.



Credit: CC0 Public Domain

Out of these myriad potential arrangements, only a few dozen have been synthesized so far. This is largely because the number of synthetic approaches to MXenes is limited by lack of understanding the chemical properties of the materials, says Dr. Vadym Mochalin, associate professor of chemistry at Missouri S&T.

Mochalin and Shuohan Huang, a chemistry doctoral student in Mochalin's group at Missouri S&T, are the first to document the gaseous products of MXenes' reactions in aqueous environments.

"Our experimental findings open up a new area of chemistry of 2-D transition metal carbides and carbonitrides," says Mochalin. "By showing how significantly different the chemistry of MXenes can be compared to their bulk analogs, we provide essential information to researchers who will now design their MXene synthesis, storage and processing strategies differently."

Mochalin says that knowledge of how MXenes interact with water is one of its fundamental chemical properties. It is important to understand in applications, especially in catalysis and sensing where the materials will have environmental exposure, he adds.

"Inorganic chemistry textbooks teach that transition metal carbides can sustain exposure to water, as well as aqueous acids or bases, without a reaction in ambient conditions and are generally good examples of chemically stable materials—which still holds true for bulk carbides," says Huang. "But since MXenes became available in 2011, researchers have applied the same hypothesis to the 2-D forms of these carbides, which we now know is no longer true."

The researchers used Raman spectroscopy and gas chromatography for the first time to analyze the composition of gasses evolved in MXene reactions with water. Their findings are published in



the journal *ACS Nano* in a paper titled "Understanding Chemistry of Two-Dimensional Transition Metal Carbides and Carbonitrides (MXenes) with Gas Analysis."

**More information:** Shuohan Huang et al. Understanding Chemistry of Two-Dimensional Transition Metal Carbides and Carbonitrides (MXenes) with Gas Analysis, *ACS Nano* (2020). DOI: [10.1021/acsnano.0c03602](https://doi.org/10.1021/acsnano.0c03602)

**Journal information:** [ACS Nano](https://doi.org/10.1021/acsnano.0c03602)

<https://phys.org/news/2020-07-chemistry-d-transition-metal-carbides.html>



Wed, 22 July 2020

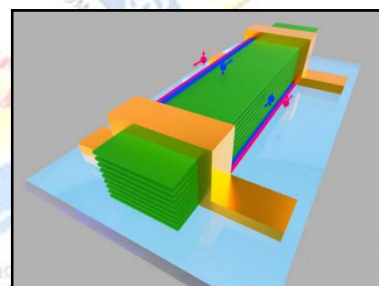
## Higher-order topology found in 2D crystal – “A variety of exciting physics to be explored”

Over the last decade, the field of condensed matter physics has experienced a golden age with the discovery of new materials and properties, and related technologies being developed at breakneck speed thanks to the arrival of topological physics. Topological physics took off in 2008 with the discovery of topological insulator, a type of material that is electrically insulating in the bulk but metallic on the surface.

Since then, scientists have found more exotic topological phases including Dirac semimetals, Weyl semimetals and Axionic insulators. But most recently, materials that are insulating in the bulk, on surfaces and edges but are metallic only on the hinges or at the corners have been theoretically predicted. These bizarre new materials called higher-order topological insulators are extremely rare and only the element bismuth has been experimentally proven to possibly belong to this category so far.

What is a hinge state anyway? Imagine a box – longer and wider than tall – with flaps on top and bottom that you can open to put things inside. The space inside the box would be called the bulk. Most materials that conduct electricity do so in the bulk. However, in topological insulators, the bulk of the box is electrically insulating but the top and bottom – the flaps – are metallic and maintain surface states. For some materials, the bulk, the top and bottom of the box are insulating but the sides (edges) are metallic. These have edge states which have been demonstrated in magnetic topological insulators. Finally, in higher-order topological insulators, the bulk, top, bottom and sides of the box are all insulating but the hinges and corners of the box are metallic and have disparate hinge or corner states. These hinge states have also been predicted to exist in topological semimetals like bismuth. The hinge states in particular are expected to be promising for the study of spintronics because the direction of their propagation is tied to their spin as well as for Majorana fermions which are actively being investigated for their applications to fault-tolerant quantum computing.

Now an international team of scientists from the United States, Hong Kong, Germany, and South Korea have identified a new higher-order topological insulator. It is a layered two-dimensional transition metal dichalcogenide (TMDC) called WTe<sub>2</sub>. This is a famous material in condensed matter physics that displays a variety of exotic properties from titanic magnetoresistance to quantized spin hall effect. It was the first example of a Type-II Weyl semimetal that can be made into devices that are only one layer in thickness and is exfoliatable like



WTe<sub>2</sub> Josephson junction: Green slabs are layers of WTe<sub>2</sub>, orange bars are niobium electrodes, and red and blue lines denote spin up and spin down electrodes traveling on two hinges of the samples. Credit: Gil-Ho Lee (POSTECH)

graphene. WTe<sub>2</sub> has also shown to superconduct under pressure which means electrons form pairs and a supercurrent travels through it without any resistance.

Adding to this carnival of properties, theoretical physicists in 2019 envisioned WTe<sub>2</sub> and its sister material MoTe<sub>2</sub> to be higher-order topological insulators with metallic hinge states. Many research teams around the world have since searched for evidence of these exotic states in WTe<sub>2</sub> and MoTe<sub>2</sub> and some recent results have shown that there are extra conductive states at their edges. But the researchers were unable to identify if these were truly edge states or the highly sought-after hinge states.

In a study published in *Nature Materials* on July 6, 2020, the team led by Kin Chung Fong (Raytheon BBN Technologies), Mazhar N. Ali (Max Planck Institute of Microstructure Physics and also Material Mind Inc.), Kam Tuen Law (Hong Kong University of Science and Technology) and Gil-Ho Lee (Pohang University of Science and Technology, and the Asia Pacific Center for Theoretical Physics) took a new approach by using the Josephson junctions to spatially resolve the supercurrent flow and to show that WTe<sub>2</sub> does indeed appear to have hinge states and is a higher-order topological insulator.

Josephson junctions are an incredibly important device and tool in physics. They are used in a variety of technological applications including magnetic resonance imaging (MRI) machines as well as in qubits, which are building blocks of quantum computers. These junctions are formed when two superconducting electrodes like niobium (Nb) are connected by a non-superconducting bridge like a high-quality WTe<sub>2</sub> in a thin film device. When the temperature is lowered enough, the supercurrent that is injected from one Nb electrode can travel across the bridge without resistance to the other Nb electrode. Therefore the overall device shows zero resistance and is said to be superconducting.

However, no infinite amount of supercurrent can be sent across the bridge while retaining superconductivity. When the injected current exceeds a critical current, the junction turns into a normal state and exhibits finite resistance. The Josephson effect states that as a function of the applied magnetic field, the critical current will oscillate in a Fraunhofer pattern between high and low values due to the changing phase of the superconducting wave-function across the sample.

The team realized that hidden in this oscillation is location information of the supercurrent while it travels in the sample. By taking an inverse Fourier transform of the Fraunhofer pattern, the researchers were able to visualize the supercurrent flow in the sample and found that it indeed travels on the sides of the WTe<sub>2</sub> device. However, this was not enough to distinguish the edge states from the hinge states.

As shown in the figure at the top of this article, due to a quirk in the symmetry-based origin of the hinge states, not all hinges are identical on the WTe<sub>2</sub> sample. For example, there are metallic hinge states on top left and bottom right hinges on the sample but not on the top right or bottom left. This is different from an edge state, which would simply be existing on the entirety of the left and right sides of the sample. Regarding this, Kin Chung Fong of Raytheon BBN Technologies explains, “We used this difference to our advantage. By connecting superconducting electrodes on just the top half of the sample and not the bottom half, we realized we would see a different Fraunhofer pattern if hinge states existed and not edge states.” He further commented, “In this configuration, electrodes would connect to only one of the hinge states (i.e. top left and not bottom right), which would show a distinct Fraunhofer pattern. If there were edge states, this configuration wouldn’t be any different than connecting to both the bottom and top halves of the sample and the Fraunhofer would look the same.” When they carried out this challenging experiment, they observed the hallmark of the hinge state, not the edge state.

“But that’s not all. WTe<sub>2</sub> is a fairly low-symmetry orthorhombic material with high crystalline anisotropy. The different directions in the crystal are not equivalent and we also theorized and confirmed that the hinge states existing in WTe<sub>2</sub> aren’t all equivalent either. In some directions, they mix into the bulk while in other directions they don’t,” explained Kam Tuen Law at Hong Kong University of Science and Technology.

“There is a variety of exciting physics to be explored in these compounds in the near future now that hinge states have been found in WTe<sub>2</sub>,” remarked Gil Ho Lee of Pohang University of Science and Technology. He added, “The possibility for dissipationless interconnections, true 1D superconducting nano-wires and spintronics devices, topological superconductivity, Majorana fermions and correspondingly topological quantum computers are all on the horizon.”

Mazhar N. Ali at the Max Plank Institute of Microstructure Physics explained, “WTe<sub>2</sub> may be the second material shown to host hinge states, but it is very different from the other candidate, bismuth. Being 2D, WTe<sub>2</sub> is easily fabricable into nano-devices with controlled surfaces, and can be layered on top of other 2D materials in heterostructures and even on top of itself when slightly twisted to form a Moire superlattice.” He added, “Its sister material MoTe<sub>2</sub> is expected to exhibit the same hinge states but it is an intrinsic superconductor at low temperatures.” He questioned excitedly, “How can these hinge states be modified, controlled, and used? There are a lot of exciting research opportunities ahead.”

#### Reference:

“Evidence of higher-order topology in multilayer WTe<sub>2</sub> from Josephson coupling through anisotropic hinge states” by Yong-Bin Choi, Yingming Xie, Chui-Zhen Chen, Jinho Park, Su-Beom Song, Jiho Yoon, B. J. Kim, Takashi Taniguchi, Kenji Watanabe, Jonghwan Kim, Kin Chung Fong, Mazhar N. Ali, Kam Tuen Law & Gil-Ho Lee, 6 July 2020, *Nature Materials*.

[DOI: 10.1038/s41563-020-0721-9](https://doi.org/10.1038/s41563-020-0721-9)

<https://scitechdaily.com/higher-order-topology-found-in-2d-crystal-a-variety-of-exciting-physics-to-be-explored/>

## COVID-19 Research News

**hindustantimes**

Wed, 22 July 2020

# Covid-19 pandemic: Wave of promising study results raises hopes for coronavirus vaccines

*Early data from trials of three potential COVID-19 vaccines released on Monday, increased confidence that a vaccine can train the immune system to recognize and fight the novel coronavirus without serious side effects*

Early data from trials of three potential COVID-19 vaccines released on Monday, including a closely-watched candidate from Oxford University, increased confidence that a vaccine can train the immune system to recognize and fight the novel coronavirus without serious side effects.

Whether any of these efforts will result in a vaccine capable of protecting billions of people and ending the global pandemic that has claimed more than 600,000 lives is still far from clear. All will require much larger studies to prove they can safely prevent infection or serious disease.

The vaccine being developed by British drugmaker AstraZeneca along with the Oxford University, induced an immune response in all study participants who received two doses without any worrisome side effects.

A coronavirus vaccine under development by CanSinoBiologics Inc and China’s military research unit, likewise showed that it appears to be safe and induced an



**FILE PHOTO:** Small bottles labelled with "Vaccine" stickers seen near a medical syringe in front of displayed "Coronavirus COVID-19" words in this illustration taken April 10, 2020. (REUTERS)



immune response in most of the 508 healthy volunteers who got one dose of the vaccine, researchers reported.

Some 77% of study volunteers experienced side effects like fever or injection site pain, but none considered to be serious.

Both the AstraZeneca and CanSino vaccines use a harmless cold virus known as an adenovirus to carry genetic material from the novel coronavirus into the body. Studies on both vaccines were published in the journal *The Lancet*.

“Overall, the results of both trials are broadly similar and promising,” Naor Bar-Zeev and William Moss, two vaccine experts from Johns Hopkins Bloomberg School of Public Health, wrote in a commentary in *The Lancet*.

However, the CanSino candidate again showed signs that people who had previously been exposed to the particular adenovirus in its vaccine had a reduced immune response.

The study authors called that “the biggest obstacle” for the vaccine to overcome.

German biotech BioNTech and U.S. drugmaker Pfizer Inc released details from a small study in Germany of a different type of vaccine that uses ribonucleic acid (RNA) - a chemical messenger that contains instructions for making proteins.

The vaccine instructs cells to make proteins that mimic the outer surface of the coronavirus. The body recognizes these virus-like proteins as foreign invaders and can then mount an immune response against the actual virus.

In the not-yet peer reviewed study of 60 healthy adults, the vaccine induced virus-neutralizing antibodies in those given two doses, a result in-line with a previous early-stage U.S. trial. The burst of announcements followed publication last week of results of Moderna Inc’s vaccine trial, showing similarly promising early results. Moderna’s vaccine also uses a messenger RNA platform.

“It’s encouraging that all these vaccines seem to induce antibodies in people,” said former World Health Organization (WHO) assistant director-general Marie-Paule Kieny of the French research institute Inserm. “This proves that the science is moving forward very quickly, which is a good sign.”

### **‘LONG WAY TO GO’**

None of these leading contenders has shown side effects that could sideline their efforts so far, but all must still prove they are safe and effective in trials involving thousands of subjects, including those at high-risk for severe COVID-19, such as the elderly and people with diabetes.

Historically, just 6% of vaccine candidates end up making it to market, often after a years-long testing process. Vaccine makers hope to dramatically compress that timeline through faster trials and by manufacturing at scale even before the products prove successful.

Several manufacturers have U.S. government backing with a goal of having a coronavirus vaccine by year’s end as cases continue to rise at a record pace.

The Oxford/AstraZeneca vaccine is one of 150 in development globally, but is considered the most advanced. Late-stage trials have begun in Brazil and South Africa and are due to start in the United States, where the infection prevalence is highest.

In its Phase I trial, the vaccine induced so-called neutralizing antibodies - the kind that stop the virus from infecting cells - in 91% of individuals a month after they got one dose, and in 100% of subjects who got a second dose. These levels were on par with the antibodies produced by people who survived COVID-19 - a key benchmark of potential success.

Oxford researcher Sarah Gilbert said the trial could not determine whether one or two doses would be needed to provide immunity.

The vaccine, known as AZD1222, also induced the body to make T cells - activating a second part of the immune system that experts increasingly believe will be important for a lasting immune response.

Recent studies show that some recovered patients who tested negative for coronavirus antibodies developed T cells in response to their infection. Scientists think both are important aspects of an effective coronavirus vaccine.

Dr Mike Ryan, head of WHO's emergencies program, said the generation of both T-cell and neutralizing antibody responses was positive, adding, "there is a long way to go."

*(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-pandemic-wave-of-promising-study-results-raises-hopes-for-coronavirus-vaccines/story-4PYMbPjvsO0lq2dyHrqbCI.html>



Wed, 22 July 2020

## **‘Russia’s first COVID-19 vaccine ready for use’: Russian Defence Minister**

***Reports suggest that the Russian Defense Ministry did not immediately respond to a request for comment. Meanwhile, The Health Ministry in response to the statement said that the tests of the vaccine are continuing, the Interfax news service reported***

New Delhi: Russian Deputy Defense Minister Ruslan Tsalikov has claimed that the country's first coronavirus vaccine candidate being developed by Gamaleya National Research Center for Epidemiology and Microbiology is "ready" for use.

The COVID-19 vaccine which was created by military specialists and scientists of the Gamaleya National Research Center for Epidemiology and Microbiology completed phase 2 trials on Monday with everyone developing immunity from the coronavirus and feeling fine, Tsalikov told Russian newspaper Argumenty i Fakty.

"Final assessments on the results of testing by our specialists and scientists of the National Research Center have been already made. At the moment of release, all volunteers without exception developed immunity against the coronavirus and felt normal. So, the first domestic vaccine against the novel coronavirus infection is ready," Tsalikov was quoted as saying in the interview by Russian news agency TASS.

However, according to multiple media reports, The Defence minister didn't inform when Phase 3 large-scale trials would be taking place or when the production of the vaccine may begin.

Reports suggest that the Russian Defense Ministry did not immediately respond to a request for comment. Meanwhile, The Health Ministry in response to the statement said that the tests of the vaccine are continuing, the Interfax news service reported.

"The third phase has not started yet, or even been announced. The reason they're in such a rush is completely incomprehensible," said Sergei Netesov, a former executive at Vector, a state-run virology center in Novosibirsk that's also working on an inoculation.

"They're all getting ahead of themselves," he added.

Russian news agency TASS reported that the Health ministry issued a permit for clinical tests of liquid and freeze-dried vaccines developed by the Gamaleya National Research Center for



**Russia has become the fourth-most affected nation by the surge in coronavirus cases. Accelerating the testing process, Russia is funding production even before the vaccine is known to work, amid a global race to find defenses against the deadly pandemic**

Epidemiology and Microbiology jointly with the Russian defense ministry's research institute No48 in June.

Russian Direct Investment Fund's head Kirill Dmitriev last week in a statement said, "The army is developing a vaccine with the state-run Gamaleya Institute in Moscow and the Russian Direct Investment Fund. Phase 3 trials, which will include thousands of people in Russia, Saudi Arabia and the United Arab Emirates, are scheduled to begin Aug. 3 and distribution of the vaccine could start as early as September."

Russia has become the fourth-most affected nation by the surge in coronavirus cases. Accelerating the testing process, Russia is funding production even before the vaccine is known to work, amid a global race to find defenses against the deadly pandemic that has wreaked economic havoc.

<https://english.jagran.com/world/russias-first-covid19-vaccine-ready-for-use-russian-defence-minister-10014259>

 **The Indian EXPRESS**

Wed, 22 July 2020

## **Lancet: 'Chinese phase 2 trial finds vaccine safe, induces immune response'**

*The phase 2 randomised controlled trial of a recombinant adenovirus type-5-vectored Covid-19 vaccine was conducted in China in April and involved 508 people*

*By Anuradha Mascarenhas*

The results of the phase 2 trial for a Covid-19 vaccine candidate, conducted in China's Wuhan, found that it was safe and induced immune response, research published in the Lancet on Monday said.

This comes close on the heels of the promising trial results of Oxford's vaccine candidate.

The vaccine in the trial in China uses a weakened human common cold virus (adenovirus, which infects human cells readily but is incapable of causing disease) to deliver genetic material that codes for the SARS-CoV-2 spike protein to the cells. These cells then produce the spike protein, and travel to the lymph nodes where the immune system creates antibodies that will recognise that spike protein and fight off the coronavirus.



This comes close on the heels of the promising trial results of Oxford's vaccine candidate. (File/Representational)

The phase 2 randomised controlled trial of a recombinant adenovirus type-5-vectored Covid-19 vaccine was conducted in China in April and involved 508 people. The primary objective was to evaluate the immune response and safety of the vaccine and determine the most suitable dose for a phase 3 trial.

Of the 508 participants, 253 received a high dose of the vaccine, 129 received a low dose and 126 received a placebo. The trial found that 95% (241/253) of participants in the high dose group and 91% (118/129) of the recipients in the low dose group showed either T cell or antibody immune responses on day 28 post-vaccination.

Adverse reactions such as fever, fatigue and injection-site pain were significantly higher in vaccine recipients than those in placebo recipients (72% in the high dose group, 74% in the low dose group and 37% in the placebo group). However, most adverse reactions were mild or moderate.



Phase 3 trials are needed to confirm whether the vaccine candidate effectively protects against the SARS-CoV-2 infection, Professor Feng-Cai Zhu, Jiangsu Provincial Center for Disease Control and Prevention, China, said. “The phase 2 trial adds further evidence on safety and immunogenicity in a large population than the phase 1 trial. This is an important step in evaluating this early-stage experimental vaccine and phase 3 trials are now underway.”

The authors noted that pre-existing immunity to the human adenovirus, which was used as the vector for this vaccine, and increasing age could partially hamper the specific immune responses to vaccination, particularly for the antibody responses.

Professor Wei Chen, Beijing Institute of Biotechnology, China, said: “It is possible that an additional dose may be needed in order to induce a stronger immune response in the elderly population, but further research is underway to evaluate this.”

<https://indianexpress.com/article/india/lancet-chinese-phase-2-trial-finds-vaccine-safe-induces-immune-response-6515440/>

**hindustantimes**

Wed, 22 July 2020

## Decoding Oxford’s Covid-19 vaccine results and why they offer hope

*AstraZeneca Chief Executive Pascal Soriot said the company hopes the vaccine will be available this year depending on how quickly late-stage trials can be completed*

*Edited By Amit Chaturvedi*

A coronavirus vaccine in development by the University of Oxford and British drugmaker AstraZeneca Plc showed promising results in early human testing and is now set to move into larger trials. The data was released on Monday, raising hopes that the world could soon find a way to stop the virus that has taken an unprecedented human and economic toll across the planet.

The data was published in leading medical journal The Lancet based on the study done on 1,077 health adults. The AZD1222 vaccine did not develop any serious side effects in them.

### The Outcome

A single dose led to antibodies by Day 28 and there was a marked increase in Sars-CoV-2 spike-specific T-cell response as early as day 7, peaking at day 14 and maintained upto day 56.

The vaccine caused minor side effects, which could be reduced by taking paracetamol.

### What This Means

The fact that the vaccine also triggered a T-cell response is an encouraging sign. A T-cell response means the vaccine was able to stimulate the part of the immunity that ‘learns’.

“We hope this means the immune system will remember the virus, so that our vaccine will protect people for an extended period,” said Andrew Pollard, University of Oxford professor.

AstraZeneca has late-stage trials underway in the UK, Brazil and South Africa and aims to start studies in the United States, where the coronavirus prevalence is higher. Results can be accrued much more quickly in regions with high rates of active infection.

AstraZeneca Chief Executive Pascal Soriot said the company hopes the vaccine will be available this year depending on how quickly late-stage trials can be completed.

A coronavirus vaccine under development by CanSino Biologics Inc and China’s military research unit, likewise showed that it appears to be safe and induced an immune response in most of the 508 healthy volunteers who got one dose of the vaccine, researchers reported.



A general view of AstraZeneca offices and the corporate logo in Cambridge, England. (AP File Photo)

Both the AstraZeneca and CanSino vaccines use a harmless cold virus known as an adenovirus to carry genetic material from the novel coronavirus into the body.

<https://www.hindustantimes.com/world-news/decoding-oxford-s-covid-19-vaccine-results-and-why-it-offers-hope/story-ayguteU5ndf0ehTn5iV7WK.html>

# Immunotherapy safe for patients with COVID-19, cancer

### Summary:

**Initial findings from a new study show that immunotherapy for cancer won't worsen complications for patients with the disease and COVID-19.**

Preliminary data from researchers at the University of Cincinnati Cancer Center show that immunotherapy doesn't necessarily worsen complications for patients with both COVID-19 and cancer.

This data is being presented by Layne Weatherford, PhD, UC postdoctoral fellow, at the American Association for Cancer Research Virtual Meeting: COVID-19 and Cancer, Monday, July 20.

Weatherford works in the lab of Trisha Wise-Draper, PhD, an associate professor of medicine, Division of Hematology Oncology, at the UC College of Medicine, UC Health oncologist and medical director of the UC Cancer Center Clinical Trials Office.

"Many COVID-19 complications result from an overactive immune response, leading to an increased production of proteins called cytokines," Weatherford says. "Increased production of these proteins can cause issues like respiratory failure. Patients with cancer are more susceptible to COVID-19 infection as well as severe complications from it."

"Many patients with cancer are treated with immunotherapy, which activates the immune system against cancer to destroy it. In patients with both COVID-19 and cancer, our team thought that immunotherapy might increase the immune system response, which could already be overactive because of the COVID-19 infection."

Wise-Draper says researchers thought treating COVID-19 patients with cancer immunotherapy might result in worsening patients' health and overall outcomes.

"We are continuing to investigate whether immunotherapy causes an increased production of these proteins by immune cells from COVID-19 patients, but our initial findings are showing that immunotherapy is not significantly impacting it," she adds.

Researchers are conducting this study using blood samples from patients with cancer taken from the UC COVID-19 biorepository, which Kris Hudock, MD, assistant professor in the Division of Pulmonary, Critical Care and Sleep Medicine at the UC College of Medicine, oversees.

"We are examining how immune checkpoint inhibitors, drugs that allow immune cells to respond more strongly, in combination with other treatments, like chemotherapy or radiation, affect the immune cells of COVID-19 patients and patients with both COVID-19 and cancer," she says.

She and Weatherford add that their preliminary data show that an anti-diabetic drug, metformin, can reduce production of these proteins by immune cells of COVID-19 patients.

"These are promising, initial findings," Wise-Draper says. "Additional research is needed, but our results show that we might be able to treat COVID-19 complications with metformin or a similar drug one day."

**Story Source:**

[Materials](#) provided by [University of Cincinnati](#). Original written by Katie Pence. *Note: Content may be edited for style and length.*

<https://www.sciencedaily.com/releases/2020/07/200720102046.htm>

## Business Standard

Wed, 22 July 2020

# Coronavirus vaccine update: Oxford, Wuhan Covid vaccines promise immunity

*There are 23 coronavirus vaccine candidates in human trials, including Moderna, AstraZeneca Plc, BioNTech, Novavax, Sinovac, CanSino Biologics and Inovio.*

*Catch latest updates on Covid-19 vaccine*

In a major breakthrough, the early-stage human trial data has revealed that the coronavirus vaccine candidate developed by AstraZeneca and Oxford University is safe. German biotech firm BioNTech and US drugmaker Pfizer also reported that their experimental Covid-19 vaccine was safe and induced an immune response in patients. The latest developments raise hope as these could contribute to ending the pandemic, which has infected over 14.7 million people worldwide and claimed over 600,000 lives so far. More than 150 possible vaccines are being developed and tested around the world, including in India, Britain, China, the US, Russia and Israel to try to stop the pandemic. At present, 23 vaccine candidates are in human clinical trials. These include those of Moderna, AstraZeneca Plc, BioNTech, Novavax, Sinovac, CanSino Biologics and Inovio Pharmaceuticals.

### **Coronavirus treatment: Updates on coronavirus vaccine/drug development:**

#### **1. Oxford coronavirus vaccine update: Vaccine safe, gives immunity**

The early-stage human trial data has revealed that the Covid-19 vaccine candidate developed by AstraZeneca and Oxford University is safe and induces immune response, with mild side effects in some participants, which scientists say can be treated with the commonly available pain medication paracetamol.

The preliminary results of the Phase-I and -II trials, published in *The Lancet* journal, involved 1,107 healthy adults, and found that the vaccine induced an immune response, both via antibodies and the T-cells of the immune system, up to day 56 of the ongoing trial.

Oxford had in April announced an agreement with the UK-based global biopharmaceutical company AstraZeneca for further development, large-scale manufacture and potential distribution of this Covid-19 vaccine candidate.

While the Phase-I trial of the vaccine candidate began in April itself, the Phase-II and -III UK trials of the Oxford vaccine, named AZD1222, in about 10,000 adult volunteers, was announced in May.

#### **2. Coronavirus vaccine update: Pfizer-BioNTech potential Covid-19 vaccine shows promise**

German biotech firm BioNTech and US drugmaker Pfizer also reported on July 20 that their experimental Covid-19 vaccine was safe and induced an immune response in patients. The companies said the data also demonstrated an induction of high level of T-cell responses against the novel coronavirus.

#### **3. 'Russia's coronavirus vaccine to be available for public by next month'**

Russia's health minister Mikhail Murashko has revealed that the vaccine that his country is currently developing to prevent Covid-19 will be available for public consumption by next month after it completes the last stage of clinical trials.



According to a *Bloomberg* report, Kirill Dmitriev, chief executive of the government-backed Russian Direct Investment Fund (RDIF), said that the Phase-III trials would begin on August 3 in Russia, the United Arab Emirates, and Saudi Arabia.

Russia will mass-produce the vaccine, around 30 million doses domestically in 2020, and 170 million for export. Five countries had already shown interest in helping Russia with the mass production, Dmitriev said.

Recently, Russia's Sechenov University had announced that it had completed clinical trials of a Covid-19 vaccine, developed by Russian defense ministry's Gamalei Institute of Epidemiology and Microbiology.

#### **4. Chinese coronavirus vaccine update**

A China-made coronavirus vaccine could be ready for market as early as the end of this year, China's State-owned Assets Supervision and Administration Commission(SASAC) said in a social media post. In trials, more than 2,000 people have received vaccines developed by the Wuhan Institute of Biological Products and the Beijing Institute of Biological Products. A vaccine could be ready for the market as early as the end of this year or early 2021, according to the May 29 post on Chinese social media platform WeChat.

Vaccines from the Wuhan Institute of Biological Products and the Beijing Institute of Biological Products had entered Phase II clinical trials. Both groups are affiliated with state-owned pharmaceutical group Sinopharm, whose management is overseen by SASAC.

#### **5. Coronavirus vaccine in India: AIIMS-Delhi begins recruiting volunteers for Covaxin human trials**

AIIMS-Delhi has begun the process of recruiting volunteers for conducting human clinical trials of the indigenously developed Covid-19 vaccine candidate Covaxin, the premier medical institute's director Dr Randeep Guleria said.

He also said that there is not much evidence of community transmission of Covid-19 happening at the national level.

AIIMS-Delhi is among the 12 sites selected by the Indian Council for Medical Research (ICMR) for conducting Phase I and II randomised, double-blind and placebo-controlled clinical trials of Covaxin.

In phase I, the vaccine would be tested on 375 volunteers and 100 of them, the highest, would be from AIIMS. The second phase, would include around 750 volunteers from all 12 sites put together.

#### **6. SII to apply for Oxford vaccine trials in India**

The Serum Institute of India (SII) will soon apply to the Indian regulator for the licensure trials of the AstraZeneca-Oxford Covid vaccine. Commenting on the AstraZeneca-Oxford vaccine's results, Adar Poonawalla, CEO, Serum Institute of India, said, "The trials have shown promising results and we are extremely happy about it. We will be applying for the licensure trials to the Indian regulator in a week's time. As soon as they grant us permission, we will begin with trials for the vaccine in India. In addition, we will soon start manufacturing the vaccine in large volumes."

#### **7. Moderna expects to start late-stage Covid-19 vaccine trial on July 27**

Moderna Inc plans to start a late stage clinical trial for its Covid-19 vaccine candidate on or around July 27, according to its listing for the phase 3 study at [clinicaltrials.gov](https://clinicaltrials.gov).

Moderna said it will conduct the trial at 87 study locations, all in the United States.

The experimental vaccine will be tested in 30 states and Washington, D.C. Around half of the study locations are in hard-hit states like Texas, California, Florida, Georgia, Arizona and North and South Carolina.

#### **8. Zydus begins human trials for potential coronavirus vaccine**

Indian pharmaceutical company Zydus said it has started human studies for its potential Covid-19 vaccine. ZyCoV-D, its plasmid DNA vaccine, was found to be safe, immunogenic and well-

tolerated in the pre-clinical toxicity studies, Zydus said. In the human trials, Zydus will enrol over 1,000 subjects across multiple clinical study sites in India.

#### **9. Coronavirus vaccine race: Novavax gets \$1.6 billion in US funding**

The US government has awarded Novavax Inc \$1.6 billion to cover testing and manufacturing of a potential vaccine for the novel coronavirus in the United States, with the aim of delivering 100 million doses by January. Novavax is somewhat of a dark horse in the race for a coronavirus vaccine. The company was not on the list of vaccine finalists for Warp Speed previously reported by the New York Times that included Moderna, AstraZeneca, Pfizer Inc, J&J and Merck & Co.

#### **10. Bharat Biotech starts human trial at PGI-Rohtak**

Haryana Health Minister Anil Vij on Friday said that human trial of a vaccine against novel coronavirus has begun at the Post Graduate Institute of Medical Sciences in Rohtak.

Human trial of COVAXIN of Bharat Biotech has started at PGIMES, Rohtak, Vij tweeted.

"Three subjects enrolled for the trial have tolerated the vaccine very well. There were no adverse effects," he added.

Although it is still unclear which if any of the vaccines will ultimately prove effective against the virus, Britain and other rich countries are already investing in the vaccines to ensure there is enough manufacturing capacity to deliver any successful candidate. Vaccines typically take years to develop and more than a dozen are in the early stages of testing globally.

[https://www.business-standard.com/article/health/coronavirus-vaccine-update-oxford-china-india-russia-vaccine-current-status-latest-news-on-corona-drug-120072100140\\_1.html](https://www.business-standard.com/article/health/coronavirus-vaccine-update-oxford-china-india-russia-vaccine-current-status-latest-news-on-corona-drug-120072100140_1.html)



