

Aug  
2020

# समाचार पत्रों से चयित अंश Newspapers Clippings

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

Volume: 45 Issue: 184 07 August 2020



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

# CONTENT

S. No.	TITLE	Page No.
<b>DRDO News</b>		<b>1-8</b>
<b>COVID-19 DRDO's Contribution</b>		<b>1-4</b>
1.	Coronavirus: India-Israel joint trials for new COVID-19 testing technologies making steady progress! Details	1
2.	Rapid testing machine to test Covid-19 in India	3
3.	Soon, Covid test results in a jiffy	4
<b>DRDO Technology News</b>		<b>5-7</b>
4.	Upgraded Tejas fighter, touted as 'real desi game-changer', to fly in 2022-23	5
5.	Smart India Hackathon 2020: Defence Institute of Advanced Technology wins first prize	7
<b>Defence News</b>		<b>8-20</b>
<b>Defence Strategic National/International</b>		<b>8-20</b>
6.	Army Chief visits 4 Corps; reviews preparedness along LAC in Arunachal	8
7.	India draws up comprehensive border management plan to keep Chinese PLA at bay	9
8.	Indian agencies seek four to six dedicated satellites for tracking Chinese military activities: Sources	10
9.	Indian Army to be equipped with a mix of Russian AK-203s & American Sig Sauer Rifles	11
10.	What PLA's India specialist officer said in 1962 gives us a clue to how China thinks	12
11.	MoD document details PLA intrusions in May	14
12.	Taking China head-on	15
13.	Corps of engineers: Indian Army's technical Arm which constructs bridges, helipads to aid mobility of troops in diverse landscapes	16
14.	Boeing bid to sell F-15EX Eagles to India faces stiff competition	18
<b>Science &amp; Technology News</b>		<b>21-34</b>
15.	Gaganyaan: Astronauts for India's first manned space mission complete training in Russia	21
16.	A reaction using light and two transition-metal catalysts to make anilines	22
17.	Comprehensive catalogue of the molecular elements that regulate genes	23
18.	Poison control: Chasing the antidote	24
19.	How cells keep growing even when under attack	27
<b>COVID-19 Research News</b>		<b>28-34</b>
20.	Moderna vaccine candidate protects mice from COVID-19: Study	28
21.	Russia claims to have completed human trials for a COVID-19 vaccine; production to begin by September	29
22.	Researchers use Theta for real-time analysis of COVID-19 proteins	31
23.	Second Russian Covid vaccine shows positive results: Report	33
24.	Novavax signs COVID-19 vaccine supply deal with India's Serum Institute	34

-----



Fri, 07 Aug 2020

## Coronavirus: India-Israel joint trials for new COVID-19 testing technologies making steady progress! Details

*Israel's Ambassador to India Ron Malka and NITI Aayog CEO Amitabh Kant on Wednesday visited the special site created for this purpose at the Dr Ram Manohar Lohia (RML) Hospital*

Coronavirus testing: Joint India-Israel trials for new technologies to conduct rapid non-invasive COVID-19 testing complete nine days! Israel's DRDD, Ministry of Defence and India's DRDO have collaborated and are conducting mass testing and collecting thousands of samples from both the countries to effectively reach a diagnostic solution. This would help both the countries tackle the ongoing coronavirus pandemic. Now this drive of mass testing and collection of large amounts of samples has successfully completed nine days. According to a statement issued by the Embassy of Israel in India, if everything proceeds as per the plan, the countries would be able to make rapid tests available for mass usage within the next few months.

With regard to this collaboration, Israel's Ambassador to India Ron Malka and NITI Aayog CEO Amitabh Kant on Wednesday visited the special site created for this purpose at the Dr Ram Manohar Lohia (RML) Hospital in Delhi to see how the trials are proceeding.

The statement quoted Amitabh Kant as saying that he was pleased as well as proud of the advances that the joint efforts of Indian and Israeli scientists have made with regard to research and development on COVID-19. He added that if the results come out as expected, the development would be path breaking for the entire world. He further stated that he saw immense potential for a

continued scientific and technological cooperation and assured that India would provide the required personnel, resources as well as expertise for this and the future missions.

The statement also quoted Israeli Ambassador to India Ron Malka as saying that they had received offers for similar collaborations from other countries as well, but they chose to partner with India due to the "excellent" relations the two countries enjoy. He added that in the past also, India and Israel have successfully worked together. He stated that once the research and development phase of the collaboration reaches an end, Israel is also looking to partner with India to manufacture these tests since India has a good industrial infrastructure to support large-scale manufacturing.

According to the statement, the joint trials had started on July 28. Being guided by an Israeli delegation, the trials are underway at six locations in Delhi, including the RML Hospital, Sir



The team of researchers with Israel's Ambassador to India Ron Malka and NITI Aayog CEO Amitabh Kant at the RML Hospital.

Ganga Ram Hospital, Lok Nayan Hospital, DRDO office in Rohini, Lady Hardinge Hospital and Akash Hospital. The samples that are collected in Delhi would be corroborated with the samples that had been collected in Israel earlier and with the help of these, the two countries hope to develop and validate an algorithm of the AI technologies that are used in the tests. Technologies like this would not be limited to the coronavirus pandemic, the statement added, saying that they would have the potential to overcome any other biological threat or pandemic of a similar scale in the future.

The statement also quoted DDRD delegate from Israel Yaniv Meirman as saying that unlike the presently available tests for COVID-19, the rapid tests that India and Israel hope to devise would have the potential to allow economies to function at the full capacity, while international travel and day-to-day activities would also be possible. The researchers are hoping for a simple and affordable test that can be taken by a person at their home to check whether he would be able to go out without the risk of transmission. Meirman said that this test would be a game changer when it comes to quick self-diagnosis of COVID-19.

The researchers are simultaneously working on development of four different technologies for the quick diagnosis, and even if one of them is successful, it would be a global breakthrough.

The first technology is a breath analyser, in which a person would need to blow through a tube. After this, a high frequency scan would analyse the humidity in the breath sample and detect whether the virus is present in it, all within less than a minute.

The second kind of test that researchers are working on is a thermal test that would use a saliva swab and it could have the potential to be purchased off the shelves and used at home, much like a home pregnancy test.

The third test that scientists are trying to develop would use polyamino acids to detect the proteins present in the virus within 45 seconds.

The last technology uses an audio test which can be downloaded and used like a mobile application. This would use the changes in the voice of a person to detect COVID-19 and other lung diseases.

The aim is to validate the technologies and made these tests widely available to the masses at a low rates and achieve an accuracy rate that is higher than the presently used RT PCR test.

<https://www.financialexpress.com/lifestyle/health/coronavirus-india-israel-joint-trials-for-new-covid-19-testing-technologies-making-steady-progress-details/2046446/>

Fri, 07 Aug 2020

## Rapid testing machine to test Covid-19 in India

*The test has 95% accuracy rate and results in 50 seconds*

New Delhi: As we all are aware that COVID-19 is the novel Coronavirus infection that started in last month of 2019 and has now been declared a pandemic by the World Health Organization. Whole world is dealing with an economic crisis due to the spread of CoronaVirus. Since February till August 2020, more than 600,000 deaths have been recorded in the name of Covid-19.

Currently there are two types of diagnostic tests which detect the virus where KIDOD SIENCE & TECHNOLOGIES LTD have developed a non-invasive detection device (size of as desktop computer) which does not need expert or any qualified personnel. The device can detect the virus by Saliva sample only, using the Ion-Mobility Spectrometry (IMS) technique. This testing is done in association with DRDO India.

A Research Scientist from Israel, Mr. Moshe Golan Present at the media briefing said Virus contains in general am RNA or DNA covered by capsid (protein) to protect the mRNA or DNA. Virus does not produce any virulent like bacteria. Virus has on its capsid attachment tools called spikes which are connected to capsid by lipid substance. Viruses exist on earth since 4.5 billion years. Virus wants to replicate itself and for this reason it shall enter to a live cell which has special replications systems called ribosomes. Once virus enters to our cells it will be there as long as we are alive.



Our immune system can protect us against the virus replication.

Covid 19 has the highest spikes so it can attach on the upper respiratory cells at higher rate than any other viruses. This Virion test has 95% accuracy rate and Result in 50 seconds.

In order to renew the international flights without endangering the passengers and destinations inhabitants, Virion test can screen huge number of passengers with accuracy and within a reasonable price too. This can be done within one minute, its very fast – less than 50 seconds. The procedure is very simple and testing rate is up to 70 per hour. Where in with Virion Test Covid-19 virus can be detected in 50 seconds with device having Ion-Mobility Spectrometry (IMS) technique. It can detect at early stage of cells destroying by the virus with sensitivity of as low as 150 picogram. IMS technique used to separate and identity trace number of ionized molecules in the gas phase based on their mobility in a carrier buffer gas.

Present at the event Mr. Amit Sharma, Director CoreLogix Consulting India Pvt. Ltd. Said by combining advanced Israeli and Indian technology and India's manufacturing prowess, we can find a way to resume our lives and exist alongside the virus till a vaccine is developed. Also as our Prime Minster Mr. Modi's vision for Make in India effort we are manufacturing the test Kits here in India. We appreciate the external Affair Ministry and DRDO joint effort in this land mark step of time.

<https://indiaeducationdiary.in/rapid-testing-machine-to-test-covid-19-in-india/>

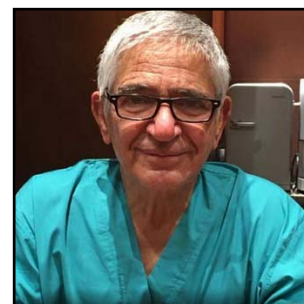
## Soon, Covid test results in a jiffy

*Israel, Indian scientists to manufacture Covid-19 diagnostic kits 'Virion tests', which promises to detect the virus from saliva samples in 50 seconds*

Hyderabad: Can a coronavirus diagnostic test provide the result in just 50 seconds with an accuracy of 95 per cent? Given the present day challenges in undergoing Covid-19 tests, such a proposition may sound quite incredible.

However, in the coming days, this could be reality with the collaboration of researchers from Israel and India.

The scientists from Israel-based Kidod Science and Technologies Ltd are collaborating with Defence Research and Development Organisation (DRDO) to manufacture Covid-19 diagnostic kits 'Virion tests', which promises to detect the virus from saliva samples in 50 seconds.



Research scientist from Israel, Moshe Golan

The Israeli researchers have developed a non-invasive detection device, which is the size of a desktop computer and does not need a qualified person to conduct the test. The device can detect the virus through saliva sample using Ion-Mobility Spectrometry (IMS) technique.

Research scientist from Israel, Moshe Golan said that Virion test will find its applications in many scenarios but will be of great help in renewing international and national flights.

“Virion test can screen huge number of passengers with accuracy and within a reasonable price too. This can be done within a minute and it’s a simple procedure. The testing rate is up to 70 tests per hour,” he said.

At present, there are two types of widely employed diagnostic tests including The RT-PCR (Polymerase Chain Reaction) test and Rapid Antigen Test (RAT). The RT-PCR tests are labour intensive, require trained microbiologists and are time consuming while RAT tests can provide results within 30 minutes but they are not as accurate as PCR tests.

“Combining advanced Israeli and Indian technology and manufacturing prowess, we can find a way to resume our lives. In line with the Make in India call given by our Prime Minister Narendra Modi, we are manufacturing these test kits in India. We also appreciate the External Affairs Ministry and DRDO for joining the effort,” says Amit Sharma, Director, Core Logix Consulting India Pvt. Ltd, which is collaborating with the Israeli firm to develop the kits in India.

<https://telanganatoday.com/soon-covid-test-results-in-a-jiffy>

Fri, 07 Aug 2020

## Upgraded Tejas fighter, touted as 'real desi game-changer', to fly in 2022-23

By Anantha Krishnan M

The Aircraft Research and Design Centre (ARDC), a vibrant wing of Hindustan Aeronautics Limited (HAL), has completed the structural design of the new variant of Light Combat Aircraft, called Tejas Mk1A.

The provisional set of drawings has also been released, which will finally be cleared by the certifying agencies. The additional system design activities are currently in progress. In six-months' time, new set of equipment will start arriving ahead for integration. By then, the final system design is also expected to be in place.

If HAL sticks to the current timelines, then the integration of new systems will begin early next year, followed by series of rig tests and later the all-critical flight tests.

It is expected close to 200 flight trials will be undertaken before all new systems are being proven as per the requirements and satisfaction of the Indian Air Force (IAF).

The advanced features of Tejas Mk1A will be proven on two limited series production (LSP) aircraft, which are part of the ongoing trials of the fighter programme.

HAL hopes to have the final configuration of the Tejas Mk1A by 2022-23.

All the current activities are expected to get a morale boost further when the ministry of defence (MoD) will finally award the contract of 83 Tejas Mk1As to HAL.

The contract worth around Rs 38,000 crore (including spares, weapons, engine testbeds), is still under finalisation and is likely to be inked in the last quarter of this year.

### Onus on HAL

Unlike the early versions of Tejas, ARDC will be the lead designer of Mk1A programme as per its workshare arrangement with Aeronautical Development Agency (ADA). With this arrangement, HAL probably also got an opportunity to lessen the trust deficit other stakeholders had on them when it came to the Tejas programme.

With so much of national pride pinned on the Tejas programme, the onus on HAL/ARDC has increased manifold now. In addition to Tejas variants, the team has the responsibility of other projects like the HTT-40, IJT and UAVs.

Future programmes like LCA-MK2, TEDBF and AMCA will also see active participation of ARDC. Tejas Mk1A is an upgraded version of the final operational clearance (FOC) configuration (Mk1) with 80 per cent of the detail components being the same.

HAL needs to deliver 20 MK1 variants to IAF for the second Tejas squadron in Sullur, the Flying Bullets.



(File) The Tejas fighter

## **Desi game-changer**

The metal cutting is expected to commence one year after the contract finalisation and as things stand now, the Tejas Mk1A will have its first flight during the last quarter of FY 2022-23. The delivery of all the 83 aircraft will be completed within six years from the supply of the first fighter.

HAL is to deliver 73 fighters and 10 trainers under the yet-to-be inked contract of 83 Tejas Mk1As.

HAL insiders term Tejas MK1A as a 'real desi game-changer', which will be setting aeronautical benchmarks for India's future fighter programmes.

What give Tejas MK1A more teeth compared with earlier version of Tejas are four key capabilities over the current variant. The major improvements are planned in operational roles, enhancing the combat ability and maintainability improvements through incorporation of active electronically scanned array (AESA) radar, electronic warfare (EW) suite and beyond-visual range (BVR) missile capabilities.

Desi air-to-air missile Astra Mk1 will be integrated on Tejas Mk1A, giving an edge to the fighter over its contemporaries in BVR warfare. "With the introduction of podded self-protection jammer (SPJ) and AESA on Tejas Mk1A, the survivability of the aircraft is further enhanced. Besides, Astra and ASRAAM (Advanced Short-Range Air-to-Air Missile), the fighter will also carry missiles for long-range as well as short-range operations. This is in addition to prevailing store configurations to increase offensive capability," an official overseeing the programme said.

The AESA radar will give Tejas improved range with near-simultaneous missile-firing options on multiple targets and increased situational awareness with mode interleaving.

"The AESA radar will be electronically scanned agile beam radar based on transmit/receive modules (TRM) and supports multimode operation. The radar is having capability to track multiple targets at a time in air-to-air, air-to-ground and air-to-sea modes," says the official.

The unified electronic warfare suite (UEWS) will provide capabilities for electronic countermeasures (ECM) and ECCM (electronic counter-countermeasures), with extended band of operation for threat detection and jamming capability.

"The EW capability will increase survivability of the aircraft in a networked environment. With the integration of an external jamming pod, the aircraft will be able to do its duty as offensive air combat platform," he added.

## **More real estate**

Additional features that are getting on board Tejas Mk1A, boosting its precision warfighting capabilities, include a digital moving map with 2D maps and 3D perspective view, provision for GLONASS (Global Navigation Satellite System), the Indian Regional Navigation Satellite System (IRNSS)-based positioning system, GAGAN (GPS-aided geo-augmented navigation) and SBAS (Satellite-based Augmentation system).

"The Tejas Mk1A will have excellent manoeuvrability, unhindered by control and stability considerations, over the widest possible speed and CG (centre of gravity) range from + 8 to -3g," says the official.

On the maintainability front, the new Tejas promises to be a delight for the ground support crew with ARDC planning to incorporate many new features.

"The idea is to step up the availability of aircraft and reduce the turnaround time. Based on various inputs, we are making changes in the roots of the aircraft," says the official.

New panels are getting in to reduce the DI (daily inspection) time. A new concept called 'panel-in-panel' will be in place to increase the visibility of the components during DI.

It is certain that the designers and engineers are leaving no efforts to create real estate on Tejas Mk1A to address long-term maintainability issues. New set of cables are to be used in increasing more space inside the aircraft.

<https://www.theweek.in/news/india/2020/08/06/upgraded-tejas-jet-touted-as-real-desi-game-changer-to-fly-in-2022-23.html>



## Smart India Hackathon 2020: Defence Institute of Advanced Technology wins first prize

*Smart India Hackathon 2020: The Defence Ministry, in a statement, said DIAT's team of six members provided a solution titled "DRISHTI" to recognise face, expression and gesture using artificial intelligence (AI)*

New Delhi: Smart India Hackathon 2020: Pune-based Defence Institute of Advanced Technology (DIAT) has won the first prize in the Smart India Hackathon (SIH) 2020, a National-level digital product building competition.

The Defence Ministry, in a statement, said DIAT's team of six members provided a solution titled "DRISHTI" to recognise face, expression and gesture using artificial intelligence (AI).

The team, led by Dr Sunita Dhavale, won the first prize of Rs 1 lakh "for solving problem statement MS331 in the category of software posed by the Madhya Pradesh government", it said.

DIAT is a deemed university under the Ministry's Department of Defence Research and Development.

Dr G Satheesh Reddy, Secretary, Department of Defence Research and Development, has congratulated the DIAT Team on winning the award for a consecutive second time.

The SIH-2020 is a 36-hour non-stop digital product building competition for software edition organised jointly by the Ministry of Human Resource Development and All India Council for Technical Education, the statement said.

It was organised between August 1 and 3 at Noida Institute of Engineering and Technology in Greater Noida.

<https://www.hindustantimes.com/education/bihar-board-passes-2-14-lakh-10th-12th-students-to-avoid-compartment-here-s-how-to-check-results/story-Bmar5SLJ1FAaoQ5U8R6GaK.html>



Smart India Hackathon 2020. (PTI file)

## Business Standard

Fri, 07 Aug 2020

### Army Chief visits 4 Corps; reviews preparedness along LAC in Arunachal

*The Army Chief was given a detailed briefing by senior army officials about deployment of troops and weaponry along the LAC, the de-facto border between India and China*

New Delhi: Army Chief Gen MM Naravane on Thursday visited Tezpur-based 4 Corps headquarters and carried out a comprehensive review of India's military preparedness along the Line of Actual Control (LAC) in Arunachal Pradesh, official sources said.

The Army Chief was given a detailed briefing by senior army officials about deployment of troops and weaponry along the LAC, the de-facto border between India and China.

In view of the tense border row with China in eastern Ladakh, the Army has significantly ramped up deployment of troops in all sensitive areas along the nearly 3,500-km-long LAC including in the Arunachal and Sikkim sectors.

The Indian Air Force (IAF) has also deployed additional fighter jets and attack helicopters in key bases looking after the airspace along the LAC in the Arunachal sector, the sources said.

With the disengagement process in eastern Ladakh not moving forward, the Army is preparing to maintain current strength of troops and weapons along the LAC during the winter months as well, the sources said.

"The Army Chief carried out a comprehensive review of military preparedness in the Arunachal sector," said a source.

The 4 Corps based in Assam's Tezpur town is tasked to keep a vigil on the LAC in Arunachal sector.

Gen Naravane is scheduled to return to Delhi on Friday.

India and China have held several rounds of diplomatic and military talks aimed at disengagement of troops from friction points in eastern Ladakh.

On August 2, the two armies held the fifth round of Corps commander-level talks in an effort to expedite the disengagement process.

At the talks, the Indian side insisted on complete disengagement of Chinese troops at the earliest and immediate restoration of status quo ante in all areas of eastern Ladakh prior to May 5 when the standoff began following a clash between the two armies in Pangong Tso.

The Chinese military has pulled back from Galwan Valley and certain other friction points but the withdrawal of troops has not moved forward from the Finger areas in Pangong Tso since mid-July, according to sources.

India has been insisting that China must withdraw its forces from areas between Finger Four and Eight. The mountain spurs in the area are referred to as Fingers.



The Army has significantly ramped up deployment of troops in all sensitive areas along the nearly 3,500-km-long LAC including in the Arunachal and Sikkim sectors

The formal process of disengagement of troops began on July 6, a day after a nearly two-hour telephonic conversation between National Security Advisor Ajit Doval and Chinese Foreign Minister Wang Yi on ways to bring down tensions in the area.

In the first round of the Corp commander-level talks on June 6, both sides finalised an agreement to disengage gradually from all the standoff points beginning with Galwan Valley.

However, the situation deteriorated following the Galwan Valley clashes on June 15 in which 20 Indian army personnel were killed. China has not released information on casualties on its side but according to an American intelligence report it was 35.

The second round of talks took place on June 22.

In the third round of military talks on June 30, both sides agreed on an "expeditious, phased and step wise" de-escalation as a "priority" to end the standoff.

After the Galwan Valley incident, the government has given the armed forces "full freedom" to give a "befitting" response to any Chinese misadventure along the LAC.

The Army has sent thousands of additional troops to forward locations along the border following the deadly clashes. The IAF has also moved air defence systems as well as a sizable number of its frontline combat jets and attack helicopters to several key air bases.

[https://www.business-standard.com/article/defence/army-chief-visits-4-corps-reviews-preparedness-along-lac-in-arunachal-120080601883\\_1.html](https://www.business-standard.com/article/defence/army-chief-visits-4-corps-reviews-preparedness-along-lac-in-arunachal-120080601883_1.html)

THE ECONOMIC TIMES

Fri, 07 Aug 2020

## India draws up comprehensive border management plan to keep Chinese PLA at bay

### Long haul ahead

As China's commitment for disengagement at the border in Eastern Ladakh remains unsatisfactory, India has directed its armed forces to prepare for a long haul, sources said on Tuesday, according to a report by IANS.

### Border management

As ET previously reported, India is also all set to ramp up its infrastructure along the international border with China and complete work on as many as 42 strategic Indo-China Border Roads (ICBRs) before 2022, officials have said. The Centre had identified 73 "strategic roads" along the China border, 28 of which were made operational, 33 are still under construction while the work on remaining are in the initial stages, they added.



### On a war-footing

To overcome administrative hurdles, the government is in the process of further relaxing norms for projects concerning national defence, strategic considerations and security purposes, the official added. India and China share a 3,488-km-long border running along Arunachal Pradesh, Sikkim, Uttarakhand, Himachal Pradesh and Ladakh.

### Strategic infrastructure

"Of these 73 roads, 61 roads of 3,410 km length were entrusted to BRO while the remaining was to be completed by CPWD and ITBP. The development of these roads would enhance accessibility to border areas where the border infrastructure and forward connectivity are lacking," a second official explained. Besides roads, the strategic infrastructure includes mobile towers, strategic railway lines and border outposts (BOPs).

## The four states

As many as 27 districts in four states — Arunachal Pradesh, Uttarakhand, Sikkim, Himachal Pradesh and Union Territory of Ladakh — abutting China have been earmarked as part of the Centre's border area development plan 2020-21, officials said. Projects in strategically important villages, identified by border guarding forces like ITBP and BSF, were prioritised, they added.

<https://economictimes.indiatimes.com/news/defence/india-draws-up-comprehensive-border-management-plan-to-keep-chinese-pla-at-bay/strategic-infrastructure/slideshow/77390520.cms>



Fri, 07 Aug 2020

# Indian agencies seek four to six dedicated satellites for tracking Chinese military activities: Sources

*Seeking to keep a closer eye on the activities of the Chinese military both near the Indian territory as well as in its depth areas all along the 4,000 kilometre Line of Actual Control (LAC), the Indian security agencies feel there is a requirement of four to six dedicated satellites which can help them keep a check on the adversary's moves*

*Edited By Ritesh K Srivastava*

## Highlights

- **Indian agencies seek four to six dedicated satellites for tracking Chinese military activities**
- **Additional satellites will help Indian agencies in keeping an eye on 4,000 kilometre Line of Actual Control**
- **Chinese Army in the garb of an exercise in the Xinjiang on its side of the LAC mobilised more than 40,000 troops along with heavy weaponry and artillery**
- **Indian and Chinese troops recently clashed in the Galwan Valley in eastern Ladakh**

New Delhi: Seeking to keep a closer eye on the activities of the Chinese military both near the Indian territory as well as in its depth areas all along the 4,000 kilometre Line of Actual Control (LAC), the Indian security agencies feel there is a requirement of four to six dedicated satellites which can help them keep a check on the adversary's moves.

The need has been felt after the Chinese Army in the garb of an exercise in the Xinjiang region on its side of the LAC mobilised more than 40,000 troops along with heavy weaponry and artillery and started rushing them towards Indian territory and transgressed into Indian territory at multiple locations surprising the Indian formations located in Leh including the 14 Corps headquarters.



"To improve the coverage of the activities of the Chinese troops and forces in both near Indian territory and in their depth areas, there is a need for four to six dedicated satellites with very high-resolution sensors and cameras giving ability to keep a close watch even on the movement of small objects and individuals," defence sources said.

The capability and assets would also help the country to reduce dependence on foreign associates to keep a watch on Chinese and other adversaries, they said. The Indian Armed Forces already have a few military satellites which are used for keeping a close watch on the adversaries but there is a need to further strengthen that capability, the sources said.

At the moment, Chinese troops have transgressed into Indian Territory in Finger area along the Panging Tso lake where they are refusing to disengage completely and want to create an observation post at Finger-5. In the Gogra area also, they are maintaining some elements.

Because of the lack of clarity about the Chinese activities, the Indian side took time to build up its numbers in Ladakh and additional forces had to be pumped in from adjoining areas and reserve formations were also moved there.

The Chinese have created a similar build up all along the LAC opposite Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh but the Chinese troops there are in depth areas. In the Ladakh sector, the Defence Ministry has now admitted that the Chinese troops have transgressed into Indian territory at multiple locations.

The Chinese had started the conflict with India on May 5 when they marched into the Galwan valley in very high numbers and tried to change the status quo on the LAC but the Indian forces managed to handle the situation well.

<https://zeenews.india.com/india/indian-agencies-seek-four-to-six-dedicated-satellites-for-tracking-chinese-military-activities-sources-2301030.html>



Fri, 07 Aug 2020

## **Indian Army to be equipped with a mix of Russian AK-203s & American Sig Sauer Rifles**

*Amid the ongoing India-China border dispute along the Line of Actual Control (LAC) in the Galwan valley, the Indian Army will get 73,000 Sig Sauer 716 assault rifles from the US*

With no certainty of when the dispute will likely be resolved, a second order of the rifles has been placed over and above the 72,400 assault rifles already purchased from Sig Sauer.

“We are going to place an order for 72,000 more of these rifles under the financial powers granted to the armed forces,” Defence sources had earlier told ANI. “A contract is expected soon. The US firm will have to deliver the rifles within a year from the date of finalising the deal,” confirmed a defence official earlier.

The order was cleared today by the Defence Ministry’s Services Capital Acquisition Plan Categorisation Higher Committee (SCAPHC) and is worth Rs 800 crore.

The Sig Sauer 716 assault rifles are meant to replace the indigenous Indian Small Arms System (INSAS) 5.56x45mm rifles used by the forces and manufactured locally by the Ordnance Factories Board, that came to the infantry about 20 years ago. Since this is a repeat order, there will be no need for trials and cost negotiation, which can often be a time-consuming process.

As per the plan, around 1.5 lakh imported rifles are to be used by the troops in the counter-terrorism operations and frontline duties on the Line of Control (LoC) in Kashmir which are called Battle or Border Action Team (BAT) attacks. The remaining forces would be equipped with the AK-203 rifles, which are to be produced jointly by India and Russia at Amethi ordnance factory.

Even with the ongoing process of disengagement through military and diplomatic channels, it is still uncertain when the India-China dispute will get fully resolved. Such military order of rifles is likely to boost the capabilities of the Army’s infantry unit.

<https://eurasianimes.com/indian-army-to-be-equipped-with-a-mix-of-russian-ak-203-american-sig-sauer-rifles/>

## What PLA's India specialist officer said in 1962 gives us a clue to how China thinks

*Zhang Guozhu communicated the decisions of the Central Military Commission to the frontline troops and hence, was well aware of China's reasons for the war*

*By Lt Gen HS Panag (Retd)*

In the first week of June, I had the opportunity to read the pdf version of a book written by a frontline young Lieutenant who had served in the People's Liberation Army in the 1962 war with India, and was attached to the General Political Department of Xinjiang Military District. He was someone privy to the Chinese point of view in the war, and offers sharp opinions on Jawaharlal Nehru, New Delhi's political and military strategies, Indian Army and Indian Prisoners of War.

### **A war that should not have happened**

The book — *A war that should not have happened* — commemorating the 50th anniversary of the India-China war is written by Zhang Guozhu, and makes an interesting read. Guozhu graduated from Beijing University's Department of Eastern Languages, specialising in Hindi, and in 1961 was assigned to the PLA as an officer, which ended his impoverished college life, but improved the economic situation of his family. He vividly describes how China, because of the Great Leap Forward and the Cultural Revolution, was going through severe droughts and economic deprivations.

In April 1962, Guozhu was assigned to the Liaison Department of the General Political Department of the Xinjiang Military Region at Urumqi. Being the only specialist Hindi interpreter in the military region, he was much in demand. Guozhu had access to Indian newspapers, including *Sainik Samachar*, the fortnightly magazine published by the Ministry of Defence. The young Lieutenant was an eyewitness to the preparations for the war and the long, and difficult lines of communication from Xinjiang to Eastern Ladakh.

Guozhu was responsible for conveying the decisions of the Central Military Commission (CMC) to the frontline troops and hence, he was well versed with the reasons of the war from the Chinese point of view. From July 1962 onwards, he served in the Galwan Valley and also participated in the attack on the Galwan Post on 20 October 1962, when the war broke out. Later on, he was part of the management of PoWs in Xinjiang. Guozhu, in his book, makes interesting observations about the besieged Indian troops, based on his interaction with them.

### **Causes of the war**

There were two fundamental causes for the 1962 war:

- The threat posed by India's Forward Policy to Chinese territory and the security of the PLA posts, with the Indian Army attempting to outflank them.
- India's effort to undermine Chinese control of Tibet and its attempts at restoring the pre-1949 status quo ante.

Guozhu's account suggests that the Chinese viewed Jawaharlal Nehru and the Dalai Lama as the personalities responsible for the war. The US and other Western powers, and even revisionist USSR, were perceived to be supporting India. The book suggests how the Chinese held Mahatma Gandhi in high regard and appreciated India's support for China in the international arena. The author acknowledges Aksai Chin and Eastern Ladakh as frontier regions with no clear demarcation of the boundary. However, after the Dalai Lama's escape and the subsequent grant of asylum by India in March 1959 and New Delhi's aggressive Forward Policy with Army troops, China began to view India as a friend gone rogue who must be punished.

Based on the political instructions he received from the Central Military Commission, which he conveyed to frontline troops, Guozhu explains in detail the instructions issued to the posts before the war broke out — exercise restraint and mirror the actions of the aggressive Indian troops without provoking them, and leave escape routes once the counter-encirclement is carried out. However, Guozhu says that once the war was declared, the aim of the PLA was annihilation of enemy troops.

The author sums up Mao's decision to go to war, "This decision has the effect of killing three birds with one stone. One, (it) can curb Nehru's 'advance policy' (*Forward Policy*) and protect the country from infringement; two (it) can warn those who take advantage of the danger that China is still strong and cannot be violated; three, it can ease the domestic pressure caused by the consequences of the extreme left course."

### **The battle of Galwan river**

The author had brief tenures in Daulat Beg Oldi Sector and Kongka La, but spent the bulk of his time in Galwan river area. He grudgingly mentions how the Indian Army had surprised the PLA when a platoon of 1/8 Gorkha Rifles took the route via Hot Springs-Kugrang River and set up a post at Samzumling on 4 July 1962 to get behind the PLA post. The PLA had to rush a battalion from the rear to carry out the counter-encirclement.

Over the next three months, before the war began on 20 October 1962, Guozhu describes his interaction with the Indian troops. He initiated the first meeting by singing the title songs of Hindi films *Aawara* and *Do Bigha Zameen*. Guozhu appreciates the conduct of the Indian soldiers but also notes the poor siting of their defences and the inferior quality of weapons, equipment and clothing. He describes in detail his rather crude failed attempts at brainwashing Gorkha troops — by urging them not to fight for India, citing the China-Nepal friendship. As per the CMC's policy, maximum restraint was exercised by the PLA and helicopter drops of supplies on the Indian side were not interfered with. The Indian Army replaced the platoon of 5 JAT by helicopters between 4 and 12 October, but the Chinese didn't hinder their activity, Guozhu claims.

The attack on the Galwan post in the early hours of 20 October 1962 is also described, chronicling the superiority of the PLA and the rout of the company of 5 JAT. The JAT, under Major Hasabnis (later Lieutenant Colonel) fought bravely and lost 36 out of its 68 soldiers. Rest were wounded and taken PoW. Guozhu describes the stoic conduct of Major Hasabnis, and his address to the 'remnants' of his company just after being taken PoW.

### **Handling of PoW**

After the war got over, the author was responsible for indoctrination of the PoWs at a camp in Xinjiang. He chronicles how the Indian officers were separated from the soldiers, but allowed to have meals together. Despite the Chinese propaganda, he notes that the soldiers remained loyal to their officers. He mentions the disdain the Indian PoWs showed for building and cleaning toilets, pointing out that this was the job of the menials. However, after the PLA officers demonstrated by example, they all joined in.

Guozhu doesn't dwell on the effects of the Chinese indoctrination on Indian soldiers, but certainly seems to have made friends with his counterparts.

### **Comparison of rival armies**

In the end, the author compares the rival armies. Apart from highlighting the vast differential between their capabilities, Guozhu is contemptuous of Indian political and military strategy.

He records that the Chinese intent was no secret, but the Indian political and military leadership buried its head in the sand like an Ostrich and came to grief. Guozhu hints that the Indian military leadership should have advised the government about the ill-thought forward policy against a superior enemy.

It is hard to resist comparing the present situation in Eastern Ladakh with the happenings of 1962. The immediate strategic casusbelli — our development of border infrastructure (that is perceived by the Chinese as threatening "their territory") without deploying troops to defend the same. Our initial actions being driven by an erroneous assessment of Chinese intent. And the

political and military leadership pursuing a strategy to challenge a superior adversary without an ethical assessment of the differential in military capabilities.

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

<https://theprint.in/opinion/what-plas-india-specialist-officer-said-in-1962-gives-us-a-clue-to-how-china-thinks/475890/>

## THE TIMES OF INDIA

Fri, 07 Aug 2020

### MoD document details PLA intrusions in May

By Rajat Pandit

New Delhi: The defence establishment has officially acknowledged that Chinese soldiers intruded into Indian territory in eastern Ladakh in May, amid the ongoing deadlock over troop disengagement at the faceoff sites in Pangong Tso and Gogra despite five rounds of top-level military talks.

“The Chinese side transgressed in the areas of Kugrang Nala (near Patrolling Point-15, north of Hot Springs), Gogra (PP-17A) and north bank of Pangong Tso on May 17-18,” a document, uploaded on the defence ministry’s website on Tuesday, said.

The word ‘transgression’ — used by India as a euphemism for ‘intrusion’ across the Line of Actual Control (LAC) with China — has not found mention in any official statement or document since the military confrontation erupted after the first clash between rival troops on the north bank of Pangong Tso on May 5-6. The document said the stand-off could be prolonged and the evolving situation may need prompt action.

Defence minister Rajnath Singh, in a television interview in end-May, had said a sizeable number of Chinese soldiers had “come a little further than they used to earlier”. But it was officially clarified that it should not be “misinterpreted as if Chinese troops entered the Indian side of the LAC”.

After the bloody clashes in Galwan Valley on June 15, which left 20 Indian soldiers and an unspecified number of Chinese troops dead, the external affairs ministry said the Chinese attempt to erect structures “just across the LAC” had led to the clashes. The MEA also said China had hindered “traditional” Indian patrolling patterns.

Subsequent MEA statements stressed the need for restoration of status quo through early and complete disengagement of troops “along the LAC” and de-escalation in accordance with bilateral agreements and protocols.

TOI has been reporting since May that PLA soldiers have intruded into Indian territory at multiple points in eastern Ladakh. The MoD document, which recounts the “major activities” undertaken in June, uses the word ‘transgression’ to describe the Chinese aggression on the LAC since May.

After the Chinese transgression, the first corps commander-level talks were held on June 6 to defuse the situation, but the “violent faceoff” took place on June 15, “resulting in casualties of both sides”, the government said.

Taking note of the second corps commander-level talks on June 22, it said, “While engagement and dialogue at military and diplomatic level is continuing to arrive at mutually acceptable consensus, the present standoff is likely to be prolonged. The situation in eastern Ladakh arising

**“The Chinese side transgressed in the areas of Kugrang Nala (near Patrolling Point-15, north of Hot Springs), Gogra (PP-17A) and north bank of Pangong Tso on May 17-18**  
—A new document on MoD website



from unilateral aggression by China continues to be sensitive and requires close monitoring and prompt action based on the evolving situation.”

As reported by TOI earlier, the fifth round of corps commander-level talks on August 2 failed to break the stalemate over the stalled troop disengagement in the Pangong Tso area, where a large number of PLA troops have occupied the 8-km stretch from ‘Finger-4’ to ‘Finger-8’ (mountainous spurs jutting into the lake) since May.

A smaller number of PLA troops have not withdrawn from PP-17A at Gogra. The PLA has also remained intransigent about its deep intrusion into what India considers its territory in the strategically-located Depsang-Daulat Beg Oldie sector.

Sources on Wednesday reiterated that more military talks, with higher politico-diplomatic intervention, will be required to break the stalemate. “There was no meeting ground during the military talks on August 2. Both sides did not agree to each other’s proposals,” said a source.

<https://timesofindia.indiatimes.com/india/mod-document-details-pla-intrusions-in-may/articleshow/77383206.cms>

# The Tribune

Fri, 07 Aug 2020

## Taking China head-on

*India has prepared itself for the long haul*

The Indian establishment seems to have finally come to terms with the Chinese designs. The Ministry of Defence document on the Chinese incursion in Ladakh uploaded on the MoD website on Tuesday (subsequently removed), terming it ‘transgression’, is a big step forward in accepting, analysing and responding to the imminent threat on the eastern front. Though China all along posed the biggest foreign policy challenge, Indian politicians continued to delude themselves into believing that the two countries could flourish together even in an unequal economic partnership. PM Narendra Modi’s 18 meetings with Chinese President Xi Jinping underscored the primacy of this relationship, which was structured in order to separate border disputes and economic cooperation into neat, watertight compartments.

The refusal to pull back from Pangong Tso and all other positions now held by the Indian Army is another strong indicator of a new direction in India’s China policy. At the meeting of the army commanders on Sunday, the Chinese had asked the Indian side to vacate their positions to reciprocate the Chinese pullback. The old salami slicing trick was being played out once again and India was being asked to retreat from its own territory after China having shifted the Line of Actual Control further westwards. But India has decided to dig in for the long and cruel winter preparing for a Siachen redux.



Photo for representation only.

Meanwhile, the Chinese again got rebuffed at the United Nations Security Council on Wednesday trying to raise the issue of J&K. After its failed attempt in January, China sought a discussion on J&K ‘under other business’. But most members of the Security Council rejected the move by terming J&K a bilateral issue between India and Pakistan. China is opening all fronts against India. Military and diplomatic attacks have been launched; trade and cyber ones ought to be on the anvil. This is no time for the nation to get distracted by politico-religious symbolism. Instead, this is the moment of truth about the eastern neighbour, and the Indian response on the LAC or at the UN has to be considered and holistic.

<https://www.tribuneindia.com/news/editorials/taking-china-head-on-123293>



Fri, 07 Aug 2020

## **Corps of engineers: Indian Army's technical Arm which constructs bridges, helipads to aid mobility of troops in diverse landscapes**

*The Corps of Engineers is a Combat Arm of the Indian Army which helps in providing mobility to the ground troops during operations or war time by timely construction of bridges, helipads and tracks across terrains like mountains, deserts and river beds*

*By Gautam Lalotra*

Battlefields around the world have varied landscapes and different terrains in which armies engage in conflict with each other during a war or a military confrontation. Natural obstacles like nallahs, culverts, rivulets and hillocks act as a natural deterrent for the infantry troops or mechanized armoured columns to launch assaults while attacking or maintain defensive positions while holding enemy attacks.. It is here that the technical acumen and mechanical skills of combat engineering aspect of the Corps of Engineers of a nation's Army comes to the fore.

The Corps of Engineers is a Combat Arm of the Indian Army which helps in providing mobility to the ground troops during operations or war time by timely construction of bridges, helipads and tracks across terrains like mountains, deserts and river beds.

The Combat Engineers also plays a pivotal part in defensive operations during war time by repulsing, blocking enemy assault /charges by laying mine-fields and demolition of bridges.

The Corps of Engineers has a very old and glorious history dating back to over two centuries in the form of one of the oldest arms of the Indian Army. The very genesis of the Corps of Engineers dates back to 1780 when the two regular pioneer companies of the Madras Sappers were raised.

The Group of Madras, Bengal and Bombay Sappers were formed in their respective presidencies. Subsequently, the Group of Madras, Bengal and Bombay Sappers were formed after 1857 and later merged on 18 November 1932 to form the Corps of Engineers in its present form.

The Corps of Engineers consists of four major constituents namely Combat Engineers (Bombay, Bengal and Madras Sappers), Military Engineering Service (MES), Border Roads Organisation (BRO) and Military Survey.

The Corps of Engineers has been at the fore-front of combat operations in all of India's post India wars, depicting highest acts of gallantry, conspicuous bravery and valour. General PS Bhagat from the Engineers holds the distinction of being the first officer to have won the Victoria Cross in Second World War.

The Engineers added another golden chapter to their military annals when Major Rama Raghoba Rane from the Bombay Sappers was awarded the Param Vir Chakra (PVC) during the 1947-48 Indo-Pak Conflict for making a safe passage through enemy mine fields while crawling in front of a tank.



**JAMMU, INDIA - 2014/09/09: A soldier of Indian Army's engineer core pumps air into inflatable tubes as they build a pontoon bridge across river Tawi in Mandal area of Jammu. (Photo by Pacific Press/LightRocket via Getty Images)**

Engineer units have made a stellar contribution to Indian Army's United Nations Mission with some notable engineering feats like constructing bridges, opening lines of communication during executing numerous humanitarian tasks.

The Border Roads Organisation (BRO) have done yeoman service in strengthening the defence of the motherland by leading from the front by constructing numerous roads in inaccessible areas of the Himalayas, Rajasthan and North Eastern States along the borders of India.

In peace time the 'Sappers' have always come to the rescue of their countrymen by rendering aid to the civil authorities during natural calamities such as floods and earthquakes. Engineer units have also been engaged in the counter insurgency operations in J&K and the North East.

The Corps of Engineers has produced many world class athletes and sportsmen who have brought back laurels to the nation by winning medals at major international events like the Asian Games, Commonwealth Games and other notable competitions . Notable among them have been Subedar Anil Kumar (Athletics), Subedar Katulu Ravi Kumar, Sukhen Dey (Weighlifting), Subedar TA Sujith (Swimming), Gopal Dewang, Nb Sub V Johnson (Boxing), Sapper Gurmeet Singh (Shooter) and Bhokanal Dattu (Rowing)

### **A basic fact-file into the Corps of Engineers**

**Type** - Combat Engineers

**Major Constituents of Corps:** Combat Engineers, Military Engineering Service (MES) , Border Roads Organisation (BRO) and Military Survey

**Raising** – 1780

**Corps Motto** - Sarvatra (Everywhere)

**Colours:** Maroon and blue

**Training Centre:** College of Military Engineering, Pune (CME)

**Regimental Centres of Various Combat Engineer Groups**

**Bombay Engineer Group (Bombay Sappers)** - Khadki, Pune

**Bengal Engineer Group (Bengal Sappers)** – Roorkee

**Madras Engineer Group (Madras Sappers)** – Bengaluru

<https://news.abplive.com/news/india/corps-of-engineers-a-basic-factfile-into-the-combat-technical-support-arm-of-indian-army-1305165>

## Boeing bid to sell F-15EX Eagles to India faces stiff competition

By *Sebastien Roblin*

Boeing is showing growing interest in selling its F-15EX twin-engine multi-role fighters to the Indian Air Force. Back in February, Boeing Vice President Pratyush Kumar stated the company was seeking a license to export the F-15EX to India—a request which may soon be granted according to Indian defense journalist Shiv Aror.

This latest variant of the nearly 50-year-old F-15 combines decades of upgrades developed for export model Eagles into a new multi-role platform for U.S. service with Air National Guard squadrons. The first eight F-15EXs out of an expected final order of 144 to 200 are due off the St. Louis assembly line in 2021.

Boeing has had some success exporting military aircraft to India, notably deals for Apache Guardian and Chinook helicopters, as well as C-17 transports and P-8I patrol planes. But it has so far been unsuccessful in offering another twin-engine fighter, the FA-18 Super Hornet, to meet the same Indian Air Force requirement the F-15 may be aimed at.

If Boeing can secure the necessary authorizations, the venerable F-15—a type famously undefeated in air-to-air combat—may then confront a flock of more recent designs.

### New Delhi's Endless Quest for Foreign Fighters

India's Medium Multi-Role Combat Aircraft (MMRCA) competition to procure between 126 to 200 "medium fighters" has been a mess since its inception in 2001, dragging on so long the Indian Air Force's initial preferred choice, the Mirage 2000, ceased to be available for production.

In 2012, India decided to buy France's cutting-edge Dassault Rafale fighter. But for the final deal signed in 2016, India only ordered 36 jets for €7.81 billion (over \$9.2 billion). The resulting 41% increase in unit price caused a political scandal.

Facing a huge impending shortfall of fighters as India retires its old MiG-21 and MiG-27 jets, New Delhi then issued a new requirement for 114 single-engine light fighters, which seemingly boiled down to a choice between Swedish Saab's JAS 39 Gripen fighter and an upgraded version of the Lockheed-Martin F-16 (later re-branded the F-21) built in India in cooperation with Tata.

This might have been a quick done deal, but the Indian Air Force apparently didn't really want to consider only single-engine fighters and rebooted the procurement yet *again* in February 2018, this time allowing twin-engine aircraft. While the IAF has yet to issue specific requirements, it reportedly is now seeking 114 aircraft for a procurement that could total \$15 billion or more.

For now, virtually every advanced fourth-generation jet fighter available for export (save for those from China, a military rival) is now on the table.

It's worth noting India could also eventually end up pursuing a fifth-generation stealth aircraft: perhaps a mature form of Russia's Su-57 Felon stealth fighter—though New Delhi withdrew from a program to co-develop an Indian variant called the FGFA—or Lockheed's fifth-generation F-35 stealth fighter, subject of some Indian interest.



**IN FLIGHT - JULY 6:** In this handout image provided by the U.S. Air Force, an F-15 Strike Eagle flies over Southwest Asia during combat operations in support of Operation Iraqi Freedom July 6, 2004 while in flight. (Photo by Lee O. Tucker/U.S. Air Force via Getty Images)

### **What does the F-15 bring to the table?**

The Indian Air Force faces a political choice as much as a technical one as New Delhi balances its relationship between its historical arms supplier Russia, and its growing partnership with Washington in countering pressure from China.

Notably, the U.S. CAATSA act means it could theoretically sanction India for Russian arms purchases, though it has so far refrained from doing so.

The choice will be hugely significant beyond the value of the airframes themselves. Combat aircraft are built for compatibility with national “eco-systems” of avionics (including radars, datalinks, electronic warfare suites etc.) and weapons ranging from air-to-air missiles to GPS-guided glide bombs.

For example, Russian R-73 and R-77 air-to-air missiles are compatible with both MiG-29 and Su-30 fighters; and a technician specialized in maintenance of one aircraft’s systems may more easily transfer those skills to work with another.

The IAF has never operated American jet fighters before. Currently the Indian Air Force flies Russian Su-30s, MiG-21s and MiG-29s and French Jaguars, Mirage 2000s and Rafales, in addition to its growing fleet of domestic Tejas jet fighters. The Indian Navy also operates MiG-29K carrier-based fighters. The IAF recently purchased 12 more Su-30s and 21 MiG-29s to shore up its flagging numbers.

A decision to purchase American-built fighters would require India to invest in a broader inventory of weapons and avionics systems, in turn encouraging further purchases from the United States. That would mark a politically significant break from its long history of Russian arm purchases.

### **The F-15EX versus the Field**

Let’s consider the tradeoffs between various jet fighters being considered by the IAF.

On one end of the spectrum of choices are less expensive (but not unsophisticated), short-range single-engine tactical fighters, notably the Lockheed F-16/F-21, Saab Gripen and Russia’s Mikoyan-i-Gurevich MiG-35 (an evolved MiG-29).

Though these are excellent aircraft for sparring at the border, they may have difficulty carrying heavy loads over long distances, and one wonders if the IAF really is interested in single-engine fighters having rebooted the competition to include twin-engine jets. Furthermore, India just ordered 83 more domestic Tejas single-engine jets which fill that niche.

Next, there are middle-weight twin-engine jets like the Super Hornet, Rafale and the Eurofighter Typhoon to consider. Though not stealth aircraft, these later designs boast radar cross-sections around one-fifth or less that of the Eagle.

The Typhoon is superior at high-altitude, high-speed air-to-air combat, while the Rafale is stronger at lower altitudes, can operate from more austere airfields, and has better ability to penetrate air defense capabilities thanks to its SPECTRA electronic warfare self-defense system. Both have a slower maximum speed than the Eagle’s Mach 2.5, but are capable of cruising at supersonic speeds without using afterburners while the Eagle cannot.

Boeing’s twin-engine FA-18E/F Super Hornet Block III is noted for its advanced networked sensors and its ability to achieve high angles of attack at low speeds. But though likely less expensive, it is limited by its short combat range and doesn’t exhibit the raw flight performance of its land-based European rivals.

It’s also worth recalling the IAF already chose the Rafale over the Typhoon, Super Hornet and F-16 in 2012. Reportedly the U.S. jets were downgraded because the IAF evaluation criteria emphasized hot-rod flight performance characteristics over avionics.

Further increasing the IAF’s small Rafale fleet may be more economical than procuring an entirely new type. However, the Super Hornet may also offer economies if it’s chosen to fulfill a requirement for 57 jets for the Indian Navy. The Super Hornet’s F414 turbofans may also be

integrated in future Indian combat aircraft. (However, the Indian Navy is also considering the carrier-based Rafale-M!)

Finally, on the heavy multi-role side of the spectrum are the F-15EX and its Russian counterpart, the Sukhoi Su-35S Flanker-E, a successor to the Su-30MKI Flanker-C jets in service with India.

Both the Eagle and Flanker-E are capable of attaining higher maximum speeds, flying longer distances, and carrying heavy payloads than the aforementioned light and medium fighters.

Why might India opt for a heavy fighter for its medium fighter competition? Long-range fighters may be desirable for patrolling the Indian Ocean where China's PLA Navy is increasing its presence. Heavy fighters could also conduct penetrating strikes more deeply inside enemy territory—though admittedly at significant risk due to not being stealth aircraft. Finally, heavy fighters could carry heavier munitions, including potentially hypersonic missiles or India's Brahmos cruise missile.

Compared head to head, the Su-35 undoubtedly is more maneuverable than the F-15EX thanks to its thrust-vector engines, boasts a powerful long-range multimode Irbis-E radar, and its airframe is moderately less visible on radar.

However, some of the F-15EX improvements narrow the gap between the earlier F-15C and the Su-35S in terms of sensors, self-defense systems, and payload.

For example, the F-15EX's APG-82 AESA radar is arguably superior to the Su-35's Irbis because it is higher-resolution, harder to detect and more resistant to jamming; it also can efficiently scan and jam simultaneously. The F-15EX also finally incorporates an infrared sensor, a longtime feature of Russian fighters. The F-15's dated self-defense suite has also been updated with the new EPAWSS system.

In terms of munitions, Russian R-77 air-to-air missiles theoretically out-range U.S. AIM-120 missiles. However, India reportedly found in an air battle in 2019 that jets armed with R-77s were in practice outranged by Pakistani F-16s equipped with AIM-120Cs. Russia has also reportedly struggled to produce and deploy the more advanced R-77-1 variant.

Though Russia has produced diverse precision air-to-ground weapons, the U.S. has combat-tested and mass produced such weapons on a vastly greater scale.

In terms of price, the export Su-35 and F-15EX appear to come in the mid-\$80 millions to \$70 millions according to various reports. However, Russia has claimed it can build Su-35s for roughly half that price, so India might be able to bargain for a reduced rate.

Another important consideration: the Su-35S has a service life of 6,000 flight hours, while the F-15EX is rated for an extraordinary 20,000 hours. Furthermore, India has had reliability issues with its Russian-built MiG-29 and Su-30 aircraft.

In the end much remains uncertain regarding India's fighter procurement. Is the IAF leaning towards light or heavy combat jets, or something in between? Will it opt to operate its first ever U.S.-built fighters, or keep things familiar by buying Russian as it usually has in the past? Or will New Delhi turn to a European manufacturer again?

Whatever the case, Boeing appears inclined to cast new chips into the pot of an already long-running game being played for very high stakes.

<https://www.forbes.com/sites/sebastienroblin/2020/08/06/boeing-bid-to-sell-f-15ex-eagles-to-india-faces-stiff-competition/#4c2115395396>



Fri, 07 Aug 2020

## **Gaganyaan: Astronauts for India's first manned space mission complete training in Russia**

*The astronauts were in good health and determined to continue their training, Glavkosmos, a subsidiary of Russian space organisation Roscosmos said*

Bengaluru: The four astronauts-elect for India's first manned space mission Gaganyaan have completed training in Russia on crew actions in the event of an abnormal descent module landing, Glavkosmos, a subsidiary of Russian space organisation Roscosmos said on Thursday.

The astronauts were in good health and determined to continue their training, it said.

"To date, Indian cosmonauts have completed training on crew actions in the event of an abnormal descent module landing in wooded and marshy areas in winter (completed in February 2020), on the water surface (completed in June 2020), in the steppe in summer (completed in July 2020)," Glavkosmos said.

In June 2020, they passed training in short-term weightlessness mode aboard the IL-76MDK special laboratory aircraft, and in July, they were trained to lift aboard a helicopter while evacuating from the descent module landing point, it said on its website.

The programme also included training in a centrifuge and in a hyperbaric chamber to prepare their organisms for sustaining spaceflight factors, such as G-force, hypoxia and pressure drops, it said, adding that these trainings are to be held in the near future.

Four Indian Air Force fighter pilots are currently under training in Moscow and are likely to be potential candidates for Gaganyaan, initially planned around 2022.

However, the Indian Space Research Organisation (ISRO) has indicated the mission may be delayed due to the COVID-19 pandemic and the lockdown because of it.

The Indian astronauts are undergoing training at the Gagarin Cosmonaut Training Center (GCTC) following the courses of the general space training programme and of the systems of the Soyuz MS crewed spacecraft.

The completion of their training at GCTC is scheduled for the first quarter of 2021, it said.

The contract for the training of Indian astronauts between Glavkosmos and the Human Spaceflight Center of ISRO was signed on June 27, 2019, and their training in Russia started on February 10 this year.

The entire process of preparation and training takes place in Russia, Glavkosmos said, and it includes a number of courses necessary for prospective Indian cosmonauts.

The regular courses comprise medical and physical training, learning Russian (as one of the main international languages of communication in space), and studying the configuration, structure and systems of the Soyuz crewed spacecraft.

Glavkosmos said the trainees' health status is monitored on a daily basis, and once every three months, highly professional GCTC doctors conduct their thorough medical examination.

"The GCTC instructors praise the effort and high motivation of the Indian cosmonauts. They also note their extremely serious and very professional attitude to the training process," it added.

Indian officials had earlier said that after training in Russia, the astronauts will receive module-specific training in India. In that, they will be trained in a crew and service module designed by ISRO, learn to operate it, work around it and do simulations.

(Except for the headline, this story has not been edited by NDTV staff and is published from a syndicated feed.)

<https://www.ndtv.com/india-news/gaganyaan-astronauts-for-indias-first-manned-space-mission-complete-training-in-russia-2275545>



Fri, 07 Aug 2020

## A reaction using light and two transition-metal catalysts to make anilines

By Bob Yirka

A team of researchers from the University of Manchester and pharmaceutical company AstraZeneca has developed a reaction that uses light and two transition-metal catalysts to make anilines. In their paper published in the journal *Nature*, the group describes their process and how it can be used. Valerie Schmidt, assistant professor of chemistry at the University of California San Diego, has published a News and Views piece in the same journal issue, outlining the importance of anilines and the work done by the team in the U.K.

Anilines are used in a wide range of products, from pharmaceuticals to dyes, agrochemicals, polymers and some electronic materials (which makes them very valuable). Looked at another way, they are benzene rings that have an attached nitrogen atom. They are typically made using toluene, benzene and xylenes, all of which are low-cost petrochemicals. And the method used is a nitration-reduction pathway. As Schmidt notes, they can also be made using aromatic substitutions. In this new effort, the researchers have developed a new reaction that might replace some of those currently used in production processes for creating anilines, giving companies a new option.



Credit: Unsplash/CC0 Public Domain

The method takes advantage of the fact that compounds containing nitrogen tend to react with carbonyl groups, resulting in C-N bonds. Such reactions result in the production of enamines which have a non-aromatic ring, which easily lend an electron when exposed to a light-activated catalyst. When the electron is lost, a reactive intermediate radical with an unpaired electron is created. The radical then interacts with a cobalt catalyst, which strips the hydrogen atoms from the non-aromatic rings, leaving an aromatic ring of aniline. The researchers call the process dehydrogenative amination.

The method takes advantage of the fact that compounds containing nitrogen tend to react with carbonyl groups, resulting in C-N bonds. Such reactions result in the production of enamines which have a non-aromatic ring, which easily lend an electron when exposed to a light-activated catalyst. When the electron is lost, a reactive intermediate radical with an unpaired electron is created. The radical then interacts with a cobalt catalyst, which strips the hydrogen atoms from the non-aromatic rings, leaving an aromatic ring of aniline. The researchers call the process dehydrogenative amination.

The researchers tested their process by using it to make a host of anilines, many of which are commonly used in pharmaceuticals. They even went so far as to use the anilines they created to make several types of medicinal pills in common use. The researchers have not yet tested how well their approach can scale to manufacturing levels, however; thus, more work still needs to be done.

**More information:** Shashikant U. Dighe et al. A photochemical dehydrogenative strategy for aniline synthesis, *Nature* (2020). DOI: [10.1038/s41586-020-2539-7](https://doi.org/10.1038/s41586-020-2539-7)

**Journal information:** [Nature](#)

<https://phys.org/news/2020-08-reaction-transition-metal-catalysts-anilines.html>

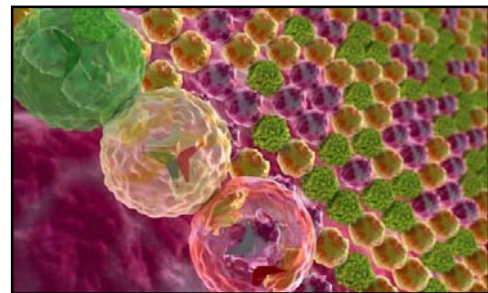


# Comprehensive catalogue of the molecular elements that regulate genes

By Aliyah Kovner

A 17-year research project has generated a detailed atlas of the genome that reveals the location of hundreds of thousands of potential regulatory regions—a resource that will help all human biology research moving forward.

Of the three billion base pairs in the human genome, only 2% code for the proteins that build and maintain our bodies. The other 98% harbors, among other things, potential regulatory regions—sequences that give cells the instructions and tools needed to turn protein recipes into an astonishingly complex organism. Yet despite their importance and prevalence, non-coding regions have been studied much less than gene-coding sequences, in part because it is more difficult to do so.



An artistic representation of gene regulating elements, which allow cells with the same genetic code to differentiate into many different tissues and play many varied roles in the body. Credit: Ella Maru Studio

The Encyclopedia of DNA Elements (ENCODE) collaboration was launched by the National Human Genome Research Institute with the goal of developing the tools and expertise needed to shed light on our genome's mysterious majority. Now in its final year, ENCODE has made huge advances thanks to the combined scientific and technological prowess of several hundred researchers at dozens of institutions.

"We've sequenced the human genome and we largely know where genes are. But when you get outside genes, mapping the function of genomic 'dark matter' is much more daunting. It's a big step forward for us to know how to find the areas within the 98% that are functionally important," said Len Pennacchio, a senior scientist at Lawrence Berkeley National Laboratory



An illustration of DNA modifying elements, including histones and chemical tags. Credit: Lawrence Berkeley National Laboratory

(Berkeley Lab) and co-author on four of the 15 new ENCODE papers published this week as part of a special collection in *Nature*. In addition to their original research, Pennacchio and his Berkeley Lab colleagues also provided technical expertise and materials to other ENCODE consortium teams.

According to Pennacchio, the project's recent advances will be particularly useful for scientists studying diseases. When trying to determine the underlying causes of a condition, researchers search for genetic variants carried by affected individuals. Sometimes, he said, they find associations with sequences within genes, but often the analyses will pinpoint an area that's far away from any protein-coding sequence, and it isn't readily apparent what that DNA does. Is it

important in the heart, or the stomach? Is it important all the time or just at certain phases of development?

"Our datasets give scientists clues as to when and where that sequence functions, and which gene or genes it affects. It gives you an immediate path to follow to learn more, where previously we'd have few hints," he said.

**More information:** Chung-Chau Hon et al. Expanded ENCODE delivers invaluable genomic encyclopedia, *Nature* (2020). DOI: [10.1038/d41586-020-02139-1](https://doi.org/10.1038/d41586-020-02139-1)

**Journal information:** [Nature](https://www.nature.com)

<https://phys.org/news/2020-08-comprehensive-catalogue-molecular-elements-genes.html>



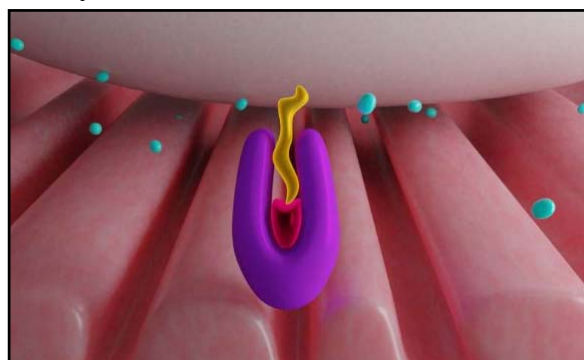
Fri, 07 Aug 2020

## Poison control: Chasing the antidote

By Sara Shoemaker

Pick your poison. It can be deadly for good reasons such as protecting crops from harmful insects or fighting parasite infection as medicine—or for evil as a weapon for bioterrorism. Or, in extremely diluted amounts, it can be used to enhance beauty.

While targeted chemical attacks on civilians tend to make headlines, the most common poisoning reports in the United States are from accidental exposure to household chemicals such as insect sprays, cleaning solutions or improperly washed fruit or vegetables. In any case, the remedy is a fast-acting, poison-chasing drug compound, and Oak Ridge National Laboratory is on the forefront developing a new generation of life-saving antidotes.



Simply put, "a poison is something that acutely degrades your health, or your health state," said Andrey Kovalevsky, a crystallographer and biochemist at ORNL. He is an expert in atomic-level understanding of enzyme function, drug binding and drug resistance. Using neutrons and X-rays, he studies how enzymes work in the body and, depending on the specifics, how to inhibit or reactivate them using small organic molecules.

A fast-acting antidote to mitigate the effects of organophosphate poisoning requires a reactivator that can effectively and efficiently cross the blood-brain barrier, bind loosely to the enzyme, chemically snatch the poison and then leave quickly. Oak Ridge National Laboratory is using neutron diffraction data towards improving a novel reactivator design. Credit: Michelle Lehman and Jill Hemman/ORNL, U.S. Dept. of Energy

"Depending on the poison and amount, the effect can be very quick—within seconds—or it can be slow," he added. The body triggers its own defenses to counteract a poisonous substance; however, it's usually not enough. Any level of exposure could be deadly, especially if the type of poison is not immediately known to a first responder or medical team attending to an affected patient.

An antidote must act fast—before the poison does irreversible damage—to be effective and save lives.

### Mirror the poison

Kovalevsky is part of a team led by Zoran Radić of the University of California, San Diego, developing a new family of antidotes for poisons called organophosphates, which include nerve agents. Radić's research uniquely targets the root cause of organophosphate poisoning, going beyond just treating the symptoms as with existing remedies.

Their focus is on the complex biochemical mechanisms that control and maintain the body's nervous system. They start with acetylcholine, or ACh, which is a compound found at the junction of muscles and nerves and also in the brain. ACh functions as a neurotransmitter that maintains normal communication between nerves and muscles. But ACh doesn't act alone.

The enzyme called acetylcholinesterase, or AChE, is also where muscles and nerves meet. Its job is to provide specific control of the levels of ACh compound by degrading it, which ensures the nerves are functioning properly.

When a person is exposed to a nerve agent, or to copious amounts of an insect spray, for instance, the poison passes quickly from the lungs or skin into the blood stream and races to the nervous system. As it reaches the muscle-nerve junctions, the poison overwhelms and inhibits the work of the AChE enzyme.

As the AChE enzyme is under attack and unable to degrade ACh, the levels of the ACh compound rise, disrupting the balance between muscles and nerves. This wreaks havoc on the body.

"Instead of being too little of something, there's too much of this neurotransmitter. So, the nerves' receptors are overexcited, and people can go into shock, have tremors and seizures and start sweating because their glands are working too much," Kovalevsky explained. In the end, the affected person will likely die because they stopped breathing.

Radić said the antidote must mirror the poison's activity without acting as an inhibitor, too.

"These poisons, typically comprised of uncharged or neutral molecules, traverse biological membranes very quickly into the blood and are then distributed from blood to tissue, including the central nervous system. And all of this happens in minutes after exposure," he said.

"The poison gets to its target quickly, so to treat that target and recover the activity of the enzyme, we have to have an antidote that does the same."

If done right, the antidote will relieve the AChE enzyme of the poison's attack, essentially excising the poison's molecule attached to the enzyme, and allowing it to begin leveling out the ACh neurotransmitters and ultimately calm down the entire nervous system. The trick is to ensure the antidote is designed not to overstay or get too attached to the enzyme—and become part of the problem.

### **To the rescue**

In a study funded by the CounterACT Program, National Institutes of Health Office of the Director and the National Institute of Neurological Disorders and Stroke and published in the *Journal of Biological Chemistry*, Radić's team designed and tested fast-acting drugs called reactivators on three different nerve agents and one pesticide with positive initial results.

The team started with an existing drug compound (code name RS194B), which was developed by Radić and UC San Diego professor Palmer Taylor about 15 years earlier, because it had already shown promise traveling through the blood-brain barrier when tested on primates exposed to organophosphate poisoning.

However, the newly designed reactivators performed better in vitro, or outside a living organism, than RS194B, and the research team figured out why.

At the atomic level, RS194B could not reach the site of the poison's activity within the AChE molecule as efficiently as the new reactivators.

For this study, the team used X-ray crystallographic analysis to look at the RS194B complex with the AChE enzyme alone and then introduced an analog of a chemical nerve agent called VX—one of the deadliest chemicals ever made. While RS194B didn't bind as expected, the experiment did foster ideas on how to redesign "a sort of elite compound," Kovalevsky said.

"We need to improve the reactivator's ability to cross the blood-brain barrier, bind loosely to the enzyme, chemically snatch the poison and then leave quickly," Kovalevsky said. "We don't want it to stay upon reactivation, as we do for many standard drugs that normally inhibit an enzyme function."

"That's our goal. That's why designing reactivators is a completely different endeavor and many rules of conventional drug design do not apply," he added.

After some tweaks to the drug design, the team came up with a new paradigm that can completely change how researchers think about a reactivator design. They ran computer simulations and later synthesized several most promising compounds of the altered design options, which provided details on their properties and clues on how each compound might work.

They analyzed the impact of each drug design variation, plus the original RS194B, with nerve agents Sarin, Cyclosarin, VX and a pesticide Paraoxon. Also, the team included 2PAM (also called Pralidoxime)—the only antidote for organophosphate poisoning that is approved by the U.S. Federal Drug Administration for use in adults and children—which served as a control for the experiments.

"We wanted our reactivator designs to be as good as, or better than, 2PAM in these studies," said Kovalevsky. However, 2PAM is not able to cross the blood-brain barrier. It can travel to other poison-affected areas of the body to act on the peripheral nervous system, but it doesn't reactivate in the central nervous system.

Based on the study's initial results, several of the team's drug design variations worked better than RS194B and 2PAM, which Kovalevsky said is a very encouraging result for their novel reactivator design ideas.

"One of distinctions of our antidote is that they can engage different organophosphate poisons more effectively, because their reactivation structures can change with their protonation," Radić said. "Unlike X-rays, diffraction of neutrons is an experimental technique that can tell us about the position of protons in both the antidote and in the poisoned enzyme."

### **Big, tiny crystals**

To get a better picture of the novel reactivator design, the team used neutron crystallography at ORNL's High Flux Isotope Reactor, a Department of Energy Office of Science user facility. Kovalevsky operates the instrument named IMAGINE, which uses neutron diffraction techniques to look at the structure of a single crystal at atomic scale.

The molecular structure of the protein is complex, which requires growing large single crystals—a strength of ORNL's—for neutron diffraction. Neutrons are highly sensitive to light elements such as hydrogen, and they are particularly well suited to find individual hydrogen atoms in protein crystals that X-rays cannot detect. The data collected from IMAGINE, along with information from a neutron experiment performed at Institut Laue–Langevin in France, confirmed it's possible to pinpoint the location and distribution of each hydrogen atom in the protein.

The team will continue growing larger crystals for analysis, which should produce higher resolution datasets and inform adjustments to the promising, novel drug designs. Their continued research could ultimately confirm a new class of fast-acting, life-saving antidotes for organophosphate poisoning.

**More information:** Lukas Gorecki et al. Rational design, synthesis, and evaluation of uncharged, "smart" bis-oxime antidotes of organophosphate-inhibited human acetylcholinesterase, *Journal of Biological Chemistry* (2020). DOI: [10.1074/jbc.RA119.012400](https://doi.org/10.1074/jbc.RA119.012400)

**Journal information:** [Journal of Biological Chemistry](https://pubs.rsc.org/journal/cbe)  
<https://phys.org/news/2020-08-poison-antidote.html>

# How cells keep growing even when under attack

By Peter Chien

In an unexpected new finding, biochemists at the University of Massachusetts Amherst report observing that a damage-containment system in stressed bacteria can become overrun and blocked, but that this leads to cells responding by turning on very different pathways to make sure that normal growth continues.

Rilee Zeinert, a doctoral student in the Molecular and Cell Biology Program and his advisor, professor Peter Chien, report on their recent experiments and discovery about how bacteria switch gears to respond to different stresses but still maintain normal cell functions like DNA replication in the recent issue of the *Cell* journal, *Molecular Cell*. Other contributing authors include Benjamin Tu and Hamid Baniyasadi at the University of Texas Southwestern Medical Center.

Chien says that because all cells must maintain normal growth even during stressful conditions and all cells contain clean-up proteases that degrade used proteins and other waste, similar regulation may be at work in other biological responses. He suggests, "Cancer cells also are constantly growing under protein stress conditions, so understanding how cells in general take advantage of protease competition to respond to stress leads to tempting speculations that we can inhibit similar pathways to block uncontrolled growth."

In bacteria, a protease known as Lon destroys damaged proteins to protect cells from their toxic consequences and degrades normal signaling proteins, as well. Stress that is toxic to proteins—causing misfolding, for example—prompts the bacteria not only to try to keep removing these damaged proteins, but to maintain processes like replicating DNA for normal growth. Zeinert studied the Lon protease and pathways it uses during cell stress, such as antibiotic attacks or extreme heat, to accomplish this.

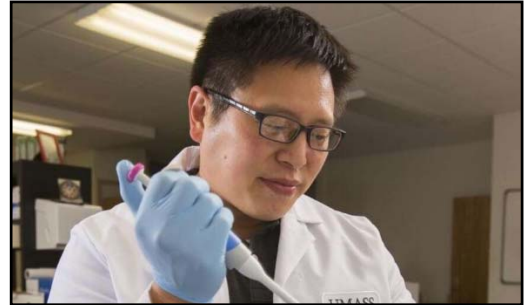
In their new paper, the authors show that when bacteria are stressed, the increase in damaged proteins ends up temporarily swamping the Lon protease. This results in stabilization of signaling proteins that would normally be degraded by Lon, which sets off a cascade of responses, Chien explains.

He adds, "The misfolded proteins are canaries in the coal mines. When they build up so much that Lon is now blocked, the cells respond by turning on pathways needed to ensure growth." In particular, the cells increase the amount of deoxynucleotides—the 'DN' of DNA—building blocks that are needed for DNA replication."

Zeinert, Chien and colleagues discovered this new pathway unexpectedly when they were exploring the essential character of different genes that depend on the Lon protease. Chien recalls, "Rilee was using a new approach that looks at the fitness cost of each gene in different mutant backgrounds. Surprisingly, he found that loss of a normally essential deoxynucleotide synthesis gene was now tolerated in cells missing the Lon protease."

This meant that by decreasing Lon activity, cells would compensate by making more deoxynucleotides, a result the researchers confirmed with metabolomics, a procedure that measures hundreds of chemicals in a cell at once, he adds.

Chien explains, "The metabolomics told us that there was a substantial shift in all the building blocks for DNA synthesis when Lon activity was compromised. At the same time, we had seen that



Biochemist Peter Chien, reports on recent experiments and discovery about how bacteria switch gears to respond to different stresses but still maintain normal cell functions like DNA replication, in *Molecular Cell*. Credit: UMass Amherst

when cells are stressed they also seem to make more of these molecules." That connection led the researchers to determine that it was the damaged proteins arising from the stress causing a block of Lon activity that resulted in this response.

Chien, who is director of the Models to Medicine Center in the Institute of Applied Life Sciences at UMass Amherst, points out that this work was funded by the National Institute of General Medical Sciences in the form of a MIRA grant to Chien and the Chemistry-Biology Training Program, which also supported Zeinert. The MIRA program does not fund individual projects, but broad programs of basic discovery research, to encourage researchers to propose more long-term, innovative, creative projects and to worry less about short-term goals and results.

**More information:** Rilee D. Zeinert et al, The Lon Protease Links Nucleotide Metabolism with Proteotoxic Stress, *Molecular Cell* (2020). [DOI: 10.1016/j.molcel.2020.07.011](https://doi.org/10.1016/j.molcel.2020.07.011)

**Journal information:** [Molecular Cell](https://phys.org/news/2020-08-cells.html)  
<https://phys.org/news/2020-08-cells.html>

## COVID-19 Research News

 **The Indian EXPRESS**

Fri, 07 Aug 2020

### **Moderna vaccine candidate protects mice from COVID-19: Study**

*Additional experiments found that mice given two injections of the 1-mcg dose and later challenged with SARS-CoV-2 virus either five or 13 weeks after the second injection were protected from viral replication in the lungs and nose, the researchers said*

Washington: US biotechnology company's vaccine candidate protected mice from infection with SARS-CoV-2, the virus that causes COVID-19, according to a study published in the journal *Nature* on Wednesday.

The findings by scientists, including those from the National Institute of Allergy and Infectious Diseases (NIAID) in the US, show that the vaccine, known as mRNA-1273, induced neutralising antibodies in mice when given as two intramuscular injections of a 1-microgramme (mcg) dose three weeks apart.

Additional experiments found that mice given two injections of the 1-mcg dose and later challenged with SARS-CoV-2 virus either five or 13 weeks after the second injection were protected from viral replication in the lungs and nose, the researchers said.

Mice challenged seven weeks after only a single dose of 1 mcg or 10 mcg of mRNA-1273 were also protected against viral replication in the lung, they said.

NIAID Vaccine Research Center (VRC) scientists worked with investigators from the University of Texas at Austin to identify the atomic structure of the spike protein on the surface of the novel coronavirus.



**The mice showed no evidence of enhanced lung pathology or excessive mucus production, indicating the vaccine did not cause enhanced disease, the researchers found.**

This structure was used by Moderna in the development of the vaccine candidate, according to the researchers.

The latest study found that the investigational vaccine also induced robust CD8 T-cell responses in mice.

It did not induce the type of cellular immune response that has been linked to vaccine-associated enhanced respiratory disease (VAERD), according to the researchers.

This rare, allergic-type inflammation was seen in individuals vaccinated with a whole-inactivated respiratory syncytial virus (RSV) vaccine in the 1960s, they said.

The researchers explained that VAERD can occur when a vaccine induces an immune response that is not strong enough to protect against infection.

They vaccinated mice with sub-protective doses of mRNA-1273 and then challenged the mice with SARS-CoV-2.

The mice showed no evidence of enhanced lung pathology or excessive mucus production, indicating the vaccine did not cause enhanced disease, the researchers found.

The team noted that the data from these studies, combined with data from studies in nonhuman primates and Phase-1 clinical testing, support the evaluation of mRNA-1273 in clinical efficacy trials.

The researchers also explained how their prior research on a candidate MERS-CoV vaccine paved the way for a rapid response to the COVID-19 outbreak.

<https://indianexpress.com/article/coronavirus/moderna-vaccine-candidate-protects-mice-from-covid-19-study-6542198/>



Fri, 07 Aug 2020

## **Russia claims to have completed human trials for a COVID-19 vaccine; production to begin by September**

*Russian is planning a mass vaccination campaign in October and the vaccine will be first given to doctors and teacher*

*By Abigail Banerji*

In a race to find a vaccine that will protect people from the novel coronavirus, six candidates from around the world are now in phase three of human trials. Recent reports from Russia claim that one of their candidates has completed all three phases of human clinical trials successfully. Russia will reportedly begin producing the vaccine soon and already has plans for a massive, country-wide vaccine drive.

Russia currently has two COVID-19 vaccine candidates in the race – one, a vaccine being developed by the Vektor State Research Center of Virology and Biotechnology. The second is a vaccine being produced by the Gamaleya Scientific Research Institute of Epidemiology and Microbiology along with the Russian Defence Ministry.

As of 1 August, *TASS* reported that human trials of the Gam-COVID-Vac Lyo – the vaccine candidate from the Gamaleya Scientific Research Institute – are now complete. The process of registering the vaccine will begin as early as 10 to 12 August. The vaccine will then be made available 'within three to seven days of registration', as per a *Bloomberg* report.



**The human trials of the Gam-COVID-Vac Lyo – the vaccine candidate from the Gamaleya Scientific Research Institute – are now complete.**

"Clinical trials of a coronavirus vaccine developed by the Gamaleya centre are over, paperwork is underway for the vaccine's registration," Russian Health Minister Mikhail Murashko pointed out in the report.

TASS reports that the head of the Russian Direct Investment Fund (RDIF) Kirill Dmitriev said the people who were injected with Gam-COVID-Vac Lyo have developed immunity on the 21st day after receiving the first dose. He said that their immunity has doubled after they received the second injection.

"I can tell you, from first and second phase we have a hundred percent of people developing immunity after day 21. It doubles after the second shot. Hundred percent of animals were also protected (against the novel coronavirus)," Dmitriev said.

However, it was only on 13 July that the reports came out with Russia claiming that their two-part phase I trial was a success.

The World Health Organisation has been tracking various COVID-19 candidates and has made no mention of the vaccine clearing all three phases of human trials. Health experts are worried that Russia is cutting corners and fast-tracking the process putting the people at risk. The WHO also stepped in and has urged the country to follow the established guidelines to produce a 'safe and effective vaccine'.

WHO spokesman Christian Lindmeier said at a press conference, "Sometimes individual researchers claim they have found something, which is of course, as such, great news. But between finding or having a clue of maybe having a vaccine that works, and having gone through all the stages, is a big difference."

Dr Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases in the United States cautioned, "I do hope that the Chinese and the Russians are actually testing the vaccine before they are administering the vaccine to anyone."

On 2 August, Chief of Russia's sanitary watchdog Anna Popova said in an interview on the *Rossiya-1* television channel, "I have no doubts that the vaccine [against the novel coronavirus] that is to reach people will be absolutely safe and, of course, efficient."

"I would like to hope that the [immunity] will be sustainable and lasting," she added.

The Russian Defence Ministry also stepped in to clarify that it "tests the vaccine on volunteers in full compliance with the acting legislation and scientific methodological regulations, in order to prevent further risks, without any attempt to reduce the duration of the research."

### **Production of vaccine to begin**

A *Reuters* report, citing an anonymous source, said that Russia's first potential vaccine will be approved by regulators this month. Production of this vaccine is all set to begin September.

Industry and Trade Minister Denis Manturov said in an interview with TASS said "The Gamaleya Institute is working on serial production with three enterprises with facilities in the Vladimir, Yaroslavl and Moscow regions, those are Generium, R-Pharm and Binnopharm... We very much hope that serial production will start as early as in September."

While no exact numbers were given, Manturov said that 'several thousands of doses' will be produced each month this year. By 2021, Russian companies will produce 'several million' doses of the Gamaleya National Research Institute of Epidemiology and Microbiology vaccine.

Dmitriev, in an interview with the *Rossiya-24 TV* channel, said that more than 20 countries from around the world have shown interest in producing the Russian vaccine.

"Our foreign partners express great interest in producing this vaccine in their countries. There is great interest from Brazil, from India, from many other countries that are very much looking forward to the Russian vaccine, the first vaccine in the world," Dmitriev told TASS.

"And more than five countries are now actively working with us to start producing the Russian vaccine," he added.



## Mass vaccination by October

On 1 August, Health Minister Murashko said that Russian plans on starting a mass vaccination campaign against the novel coronavirus in October. According to a report by *Livemint*, the vaccine will be first given to doctors and teachers.

"We plan wider [vaccination] for October because we need to launch a new system of treatment gradually," Murashko said according to a report by *TASS*.

The vaccine will also be 'free of charge' and the cost will be taken from the country's budget.

## Vektor vaccine

The EpiVacCorona vaccine being produced by the Vektor State Research Center and the Biotechnology of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing recently announced that they will begin mass production of the vaccine in November.

They had begun their human trials on 24 July and as of 4 August 2020, only three volunteers out of five have been vaccinated with the fifth volunteer getting the first dose yesterday, 5 August. The age from 18-30 years. The EpiVacCorona doses will be administered again after 21 days.

According to the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing, Russia is developing 26 additional coronavirus vaccine candidates at 17 research institutions. Murashko said that in the next six to eight weeks, developers of two other vaccines will put in their permission request to start clinical trials on volunteers.

<https://www.firstpost.com/health/russia-claims-to-have-completed-human-trials-for-a-covid-19-vaccine-production-to-begin-by-september-8679581.html>



Fri, 07 Aug 2020

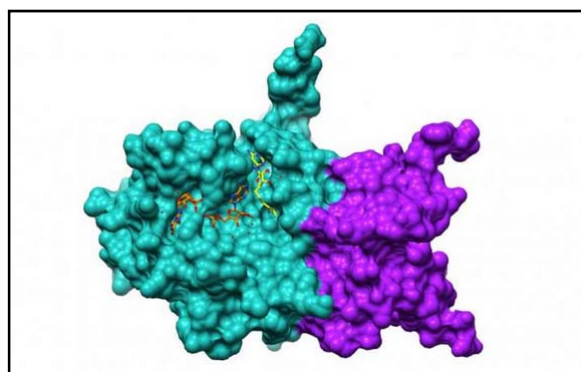
# Researchers use Theta for real-time analysis of COVID-19 proteins

By Nils Heinonen

Argonne researchers have developed a pipeline between ALCF supercomputers and Advanced Photon Source experiments to enable on-demand analysis of the crystal structure of COVID-19 proteins.

As the coronavirus SARS-CoV-2 and its associated disease, COVID-19, developed and spread across the country and planet, the U.S. Department of Energy's (DOE) Argonne National Laboratory joined the global fight by beginning work to better understand and treat the pandemic. Several such lines of research have been launched at the Argonne Leadership Computing Facility, a DOE Office of Science User Facility, to take advantage of its considerable scientific resources; one of these lines has analyzed the crystal structure of a protein complex associated with the coronavirus.

Key to understanding the coronavirus is unraveling its structure. To this end, Argonne researchers have leveraged the ALCF's Theta supercomputer to analyze crystallographic images of a protein complex associated with the SARS-CoV-2. The images come from Argonne's



Nsp10/16 surface with ligands. Researchers have developed a pipeline to connect ALCF supercomputers to APS experiments to enable real-time analysis of COVID-19 proteins, paving the way to elucidate important protein structural dynamics of the coronavirus Credit: Mateusz Wilamowski, University of Chicago, Center for Structural Genomics of Infectious Diseases; George Minasov, Northwestern University, Center for Structural Genomics of Infectious Diseases

Advanced Photon Source (APS), a DOE Office of Science User Facility, following experiments utilizing a technique known as serial synchrotron crystallography that is designed to elucidate the complex chemistry of viral proteins.

Serial synchrotron crystallography experiments employ high-intensity X-rays to reveal the structures of large molecules using only fractional radiation doses compared with the requirements of traditional crystallographic techniques. As a result, serial synchrotron crystallography permits researchers to image tens of thousands of microscopic crystals, with very short exposure lengths for each individual sample. The high speed of the technique leads to the generation of a vast array of data, the complexity and density of which necessitate sophisticated and computationally demanding analyses.

Massively parallel systems like Theta are unique in their ability to meet the demands that serial synchrotron crystallography poses for rapid, on-the-fly processing. Enabling Theta for use in on-the-fly processing is a data pipeline constructed around the supercomputer. This pipeline automates data acquisition, analysis, curation, and visualization, transporting results to a repository from which metadata can be extracted for publication.

The pipeline generates large image batches at a high rate, with data transfers achieving speeds of 700 megabytes per second thanks to Globus, a University of Chicago-run data management service.

"This pipeline's deployment between the APS and the ALCF for on-demand analysis has been a tremendous success," said Ryan Chard, a computer scientist at Argonne leading the image-processing efforts. "We achieved a processing rate of up to 95 images a second." This high speed made it possible to deliver instantaneous feedback to experimentalists at the APS.

The pipeline begins with Globus transferring images from the APS to the Theta system. The images are then analyzed and processed using FuncX, a function-as-a-service computation system that organizes the dispatch of individual tasks to available computing nodes. FuncX is subsequently also used to extract metadata about hits, identify crystal diffractions, and generate visualizations depicting both the sample and hit locations. After this the raw data, metadata, and related visualizations are published to a portal hosted at the ALCF, where they are indexed and made searchable for reuse.

Nineteen samples were analyzed across nearly 1,500 flows over the course of three ten-hour runs on the APS beam, during which over 700,000 images were processed on Theta. The resultant data were published to the data portal and used to further refine experimental work and configurations. The orchestration required to facilitate research at this scale is enabled by research data automation services currently under development on the Globus platform, and underpinned by the reliable file transfer, and secure data sharing capabilities that are already widely used across APS beamlines. These capabilities will continue to improve with future planned enhancements to APS beamlines, ALCF supercomputers, Globus, and the APS-to-ALCF network. The forthcoming APS Upgrade, which will allow researchers to see things at scale they've never seen before with storage-ring based X-rays, will increase data rates by orders of magnitude. Combining these capabilities of the ALCF and APS Upgrade will greatly enhance the scientific discovery.

"The increasing biological relevance of serial synchrotron crystallography experiments has researchers preparing a number of further experiments in the coming weeks," said Darren Sherrell, a biophysicist and beamline scientist at the X-ray Science Division of the APS. "This work paves the way to elucidate important protein structural dynamics of the coronavirus."

<https://phys.org/news/2020-08-theta-real-time-analysis-covid-proteins.html>

## Second Russian Covid vaccine shows positive results: Report

- *According to the latest reports, volunteers who participated in a Covid-19 vaccine trial by a Russian institute are in good health and no side effects of the vaccination are observed*
- *Currently three volunteers out of five have already been inoculated*

Amid the rising number of novel coronavirus pandemic, which has infected more than 19 million and became the cause of death of over 700,000 people across the world, Russia has been pushing extensively for a Covid-19 vaccine for quite some time now.

According to the latest reports, volunteers who participated in a Covid-19 vaccine trial developed by Vektor State Research Center of Virology and Biotechnology are in good health and no side effects of the vaccination are observed, the press service of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing told TASS, a Russian news agency.

"All vaccinated volunteers are in good health. No complications after the inoculation with the EpiVacCorona vaccine against the coronavirus have been recorded," the statement said.

Currently, according to reports, three volunteers out of five have already been inoculated. The fourth one will be vaccinated on August 5. The sanitary watchdog noted that the volunteers remain under constant medical observation while no situations requiring medical aid arose.

"Double vaccination after 21 days is planned. The vaccine should facilitate the development of the immunity against the novel coronavirus infection after double administration with a 21-day interval. The data collection on the antibody levels will begin already after the first inoculation," the press service explained.

Earlier, the research institute had announced that it plans to launch production of a Covid-19 vaccine in November, its Director-General Rinat Maksyutov told Vesti program on Rossiya-1 TV channel, according to a report.

"We expect to start production already in November this year. So, closer to the end of the year and the start of the next year we can talk about switching to vaccination at least for [people] from risk groups with a further switch to massive vaccination," Maksyutov said.

Apart from this, Russia is also set to start mass vaccination campaign of a previously developed Covid-19 vaccine, which is also touted as the world's first such vaccine, as soon as October, reported Reuters.

Russian Health Minister Mikhail Murashko also said Gamaleya Institute of Epidemiology and Microbiology, a state research facility in Moscow, had completed clinical trials of the vaccine and paperwork is being prepared to register it.

Meanwhile, the World Health Organization on Tuesday urged Russia to follow the established guidelines for producing safe and effective vaccines after Moscow announced plans to start swiftly producing COVID-19 vaccines.

WHO stressed that all vaccine candidates should go through the full stages of testing before being rolled out.

"There are established practices and there are guidelines out," WHO spokesman Christian Lindmeier told reporters at the United Nations in Geneva.

"Any vaccine...(or medicine) for this purpose should be, of course, going through all the various trials and tests before being licenced for roll-out," he said.

<https://www.livemint.com/news/world/second-russian-covid-vaccine-shows-positive-results-report-11596709025877.html>

Fri, 07 Aug 2020

## **Novavax signs COVID-19 vaccine supply deal with India's Serum Institute**

*The Indian drugmaker will have exclusive rights for the vaccine in India during the term of the deal and non-exclusive rights during the "Pandemic Period" in all countries other than those designated by the World Bank as upper-middle or high-income countries*

Novavax Inc said on Wednesday it has entered a supply and license agreement with the Serum Institute of India for the development and commercialization of its COVID-19 vaccine candidate.

The Indian drugmaker will have exclusive rights for the vaccine in India during the term of the deal and non-exclusive rights during the "Pandemic Period" in all countries other than those designated by the World Bank as upper-middle or high-income countries.

The deal was signed on July 30, according to an SEC filing by Novavax.

On Tuesday, Novavax reported that its experimental COVID-19 vaccine produced high levels of antibodies against the novel coronavirus in a small, early-stage clinical trial, and that it could start a large pivotal Phase III trial as soon as late September.



<https://health.economictimes.indiatimes.com/news/pharma/novavax-signs-covid-19-vaccine-supply-deal-with-indias-serum-institute/77387048>

