

July
2020

समाचार पत्रों से चयित अंश Newspapers Clippings

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Volume: 45 Issue: 163 14 July 2020



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CONTENT

S. No.	TITLE	Page No.
DRDO News		1-5
COVID-19: DRDO's Contribution		1-3
1.	DRDO-TITA pact for COVID patient tracking app	1
2.	Hyderabad: TITA inks pact with DRDO	2
3.	TITA signs pact with DRDO to implement SAMPARC software	3
DRDO Technology News		4-5
4.	Navy to get new carrier-based jet by 2032, to replace MiG-29K	4
5.	Astra Mk2 will be superior to AIM-120D and PL-15 missile: Source	5
Defence News		6-22
Defence Strategic National/International		6-22
6.	Confident of Indian Army's Capability to thwart misadventure by enemies: Chief	6
7.	US UAV, Israeli loitering bombs as Indian infantry gets lethal	7
8.	Extra Su-30s and Mig-29s but why not Mirage-2000s for IAF?	8
9.	Domestic arms makers say Army plan to reorder SIG rifles from US setback to 'Make in India'	9
10.	Build up on the border	11
11.	Caught between Indian and Chinese troops, at 15,000 feet	14
12.	Stealth vs Thrust: Why Indian Air Force needs American jets instead of Russian aircraft?	17
13.	China's laser weapon capable of destroying Indian and US satellites, say analysts	18
14.	China's J-20B Stealth Jet, upgraded with thrust vector controls, reportedly enters mass production	19
15.	Beijing calls Japan's F-35 deal with the US a big threat to China, Russia	21
Science & Technology News		22-36
16.	Tiny bubbles make a quantum leap	22
17.	New technique shows excellent potential for developing advanced photonic devices	24
18.	Merging solar cell and liquid battery produces long-lasting solar storage	25
19.	Researcher develops method for mapping brain cell change, development in mice	26
COVID-19 Research		27-36
20.	Engineered llama antibodies neutralize COVID-19 virus	27
21.	'Bats spread coronavirus, but don't get infected': Research on bats provides valuable clue to treating COVID-19	29
22.	Coronavirus (Covid-19) vaccines latest updates: CanSino Biologics to start Phase III trials; GSK to develop plant-based vaccine	30
23.	Explained: Why Russian Covid-19 vaccine is far from ready	32
24.	Coronavirus vaccine: Covid immunity may not last for too long, says new UK study	34
25.	KPIT Technologies innovates versatile ventilators in fight against COVID-19	35
26.	Coronavirus vaccine: Human trials of India's first coronavirus vaccine to begin, AIIMS Patna selects 18 volunteers for clinical trials	36



Tue, 14 July 2020

DRDO-TITA pact for COVID patient tracking app

Enables automated tracking of those in quarantine or isolation, generates alerts in case of violations

Hyderabad: Defence Research and Development Organisation (DRDO) and Telangana Information Technology Association (TITA) have joined hands to implement an automated management of patient's software SAMPARC — Smart Automated Management of Patients and Risks for COVID-19.

The pilot project for the DRDO-devised software for enforcement of quarantine or isolation is likely begin shortly with both organisations entering into an agreement online on Monday. The pact was signed by DRDO's scientist G, Center for AI & Robotics, Rituraj Kumar and TITA global president Sundeep Kumar Makthala.

SAMPARC can be a handy tool for law enforcement and health officials as it enables intelligent automated tracking of those in quarantine or isolation, generating alerts in case of violations or wilful suppression of movement details. This is expected to reduce the tracking workload of law enforcement or health officials, they said. This can be used for quarantine or isolation monitoring only and not for contact tracing, and relies on the information provided by the police and health officials. It allows geofencing, face recognition and display of data on map with hotspot information if available.

The app has to be installed on the patient's smartphone when automatically a protected message is sent to the COVID server every 10 minutes. It also generates an alarm if the patient violates the geofence of his quarantine location and sends alerts if the selfie does not match the photo taken during registration. The software would display potential violations as a red symbol. Once the quarantine period is over, the patient would be removed from tracking and they can uninstall SAMPARC app.

"We chose TITA as it has been working at the grassroot level and has implemented many programmes like digital literacy, rural citizens' connect with doctors through Tconsult, etc.," said Dr Rituraj.

"It is a matter of pride to be selected as an implementing partner for a solution devised by DRDO," said Makthala, according to a press release.

<https://www.thehindu.com/news/cities/Hyderabad/drdo-tita-pact-for-covid-patient-tracking-app/article32071909.ece>

Hyderabad: TITA inks pact with DRDO

SAMPARC created by DRDO is a software tool that can be a handy tool for law enforcement and health officials. This would enable intelligent automated tracking of those in quarantine or isolation. It will also generate alerts if there are violations or wilful suppression of movement details. This is expected to reduce the tracking workload of law enforcement or health officials

Highlights:

It will be implementing the patient information management software

Hyderabad: Defence Research and Development Organisation (DRDO) and software professionals industry body Telangana Information Technology Association (TITA) have joined hands to implement an automated management of patient's software that the former has designed. The pilot for the implementation will likely begin shortly in any district. Both the organizations have entered into an agreement on this online.

DRDO has devised SAMPARC – Smart Automated Management of Patients and Risks for Covid-19, intelligent software for enforcement of quarantine or isolation. While breaking the chain is a must to contain the spread, there have been some cases of those in quarantine or isolation moving out in public. This leads to additional workload for law enforcement and health officials to continuously monitor these individuals who are in quarantine or isolation.

The SAMPARC created by DRDO is a software tool that can be a handy tool for law enforcement and health officials. This would enable intelligent automated tracking of those in quarantine or isolation. It will also generate alerts if there are violations or wilful suppression of movement details. This is expected to reduce the tracking workload of law enforcement or health officials.

The SAMPARC solution can be deployed as a National service by NIC, or can be distributed as a State-wise or region-wise service.

This can be used for quarantine or isolation monitoring only and not for contact tracing. It relies on the information provided by the police and health officials. It allows geo-fencing, face recognition, display of data on map (with hotspot information if available).

The rollout of the solution involves no cost to the patient and local authority needs to position only a suitable computer and the software is based on a combination of open source software and DRDO developed software, and therefore does not involve costs.

Details of the patient including name, cell phone number, IMEI of the phone, coordinates of the quarantine location, duration of quarantine, email-id and optionally photographs of the patient for AI based face detection.

The app has to be installed on the patient's smartphone which would automatically send a protected message to the Covid server every 10 minutes. The app would run as a background service that would automatically restart even if the phone reboots. Based on the requirements of the authorities, the patient will be able to send Selfies taken through the SAMPARC app to the server for automated AI based face recognition.

The software would automatically generate an alarm if the patient violates the geofence of his quarantine location in four consecutive inputs received from the smartphone. It also sends out an alert if the selfie does not match the photo taken during registration. The software would display potential violations as a red symbol. Once the quarantine period is over, the patient would be removed from tracking and they can uninstall the SAMPARC app.

The online pact was signed by Dr Rituraj Kumar, Scientist G, Center for AI & Robotics (CAIR) DRDO and Sundeep Kumar Makthala, Global President – TITA.

"We chose TITA as an implementing partner as it has been working at the grass root level and has implemented many programmes like digital literacy, rural citizens connect with doctors through Tconsult, etc." said Dr Rituraj.

"It is a matter of pride to be selected as an implementing partner for a solution devised by DRDO," said Makthala.

Sunil Chaugule, William Bhavane, TITA Corporate Secretary Ajase Hussain, GWC member Srikanth Uppala supported the project.

<https://www.thehansindia.com/tehrangana/hyderabad-tita-inks-pact-with-drdo-633399>

Telangana Today

Tue, 14 July 2020

TITA signs pact with DRDO to implement SAMPARC software

The DRDO has devised SAMPARC – Smart Automated Management of Patients and Risks for Covid-19, intelligent software for enforcement of quarantine or isolation

Hyderabad: Defence equipment maker organisation DRDO and software professionals industry body Telangana Information Technology Association (TITA) have joined hands to implement an automated management of patient's software that the former has designed. The pilot will begin shortly.

The DRDO has devised SAMPARC – Smart Automated Management of Patients and Risks for Covid-19, intelligent software for enforcement of quarantine or isolation. SAMPARC can come handy for law enforcement and health officials as this would enable intelligent automated tracking of those in quarantine or isolation. It will also generate alerts if there are violations or willful suppression of movement details. This is expected to reduce the tracking workload of law enforcement or health officials. It can be deployed as a National service by NIC or can be distributed as a State-wise or region-wise service.

The rollout involves no cost to the patient and the local authority needs to position only a suitable computer. The software is based on a combination of open source and DRDO developed softwares and therefore does not involve costs. The app has to be installed on the patient's smartphone. This would automatically send a protected message to the Covid server every 10 minutes. The app would run as a background service that would automatically restart even if the phone reboots. Based on the requirements of the authorities, the patient will be able to send selfies taken through the SAMPARC app to the server for automated AI based face recognition.

This, however, cannot be used for contact tracing. Details of the patient including name, cell phone number, IMEI of the phone, coordinates of the quarantine location duration of quarantine, email-id and optionally photographs of the patient for AI based face detection are to be provided. It allows geofencing, face recognition, display of data on map (with hotspot information if available). It also sends out an alert if the selfie does not match the photo taken during registration.

The online pact was signed by Dr Rituraj Kumar, Scientist G, Center for AI & Robotics (CAIR) DRDO and Sundeep Kumar Makthala, Global President – TITA.

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<https://telanganatoday.com/tita-signs-pact-with-drdo-to-implement-samparc-software>

Navy to get new carrier-based jet by 2032, to replace MiG-29K

To revise global tender for 57 carrier-based fighters

By Dinakar Peri

New Delhi: The Navy is expected to start receiving new twin-engine aircraft carrier-based fighter aircraft being developed by the Defence Research and Development Organisation (DRDO) by 2032 and it will be a replacement for the Russian MiG-29K carrier jets in service, a defence source said.

“The Navy is expected to get the Hindustan Aeronautics Ltd. (HAL)-built twin-engine carrier aircraft by 2032. It will replace the MiG-29Ks in service which are scheduled to start going out by 2034,” the source said.

The Navy currently operates Russian-origin carrier *INS Vikramaditya* and expects to have the first Indigenous Aircraft Carrier (IAC-I) *Vikrant* operational by 2022. With a second carrier to come in, the Navy is already evaluating a global tender for 57 carrier-based twin-engine fighter aircraft.

With the new jet under development and also factoring in budgetary constraints, the Navy is looking to revise the tender for 57 carrier-based jets downwards. The revised numbers have not been finalised yet, the source stated.

Last January, the naval Light Combat Aircraft (LCA) successfully completed arrested landing and take-off on board *Vikramaditya* and has since undertaken several trials.

Deck-based fighter

Based on the experience of the carrier landing, the DRDO has offered to develop a twin-engine deck-based fighter for the Navy. With the successful deck-landing, they decided to drop the naval LCA Mk2 and move on to the twin-engine jet, the source said.

The new jet being developed by DRDO should be ready by 2026, Navy Chief Admiral Karambir Singh stated last December. The design specifications have since been finalised.

The Navy currently has 45 Russian MiG-29K aircraft and its officials had stated that there will not be enough aircraft to operate from both carriers.

The Navy is currently evaluating the responses to the Request For Information (RFI) from Boeing with its F-18 Super Hornet and Dassault Aviation with its Rafale jets. Both companies had stated that their jets can operate off the ski-jump of *Vikramaditya* and in future the *Vikrant*.

In fact, an Indian Navy team was to visit the US Naval Air Station in Maryland to witness a demonstration by Boeing on the compatibility of its F-18 Super Hornet of taking off and landing from the decks of Indian aircraft carriers. However, the visit got delayed due to the COVID-19 outbreak.

<https://www.thehindu.com/news/national/navy-to-get-new-carrier-based-jet-by-2032-to-replace-mig-29k/article32070823.ece>



To the sunset: A file photo of a MiG 29K taking off from aircraft carrier *INS Vikramaditya*. | Photo Credit: K.R. DEEPAK

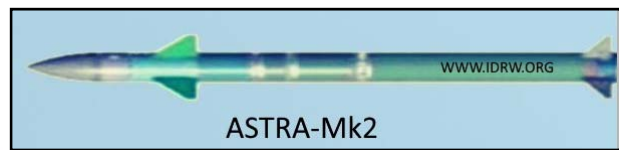


Tue, 14 July 2020

Astra Mk2 will be superior to AIM-120D and PL-15 missile: Source

Indian Air Force (IAF) and Indian Navy recently cleared plans to procure 248 Astra Mk1 beyond visual range air to air missile with a range of 110 km, making India among very few Elite Countries which have its long-range air to air missile capabilities after 50 pre-production Astra Mk1 ordered by IAF were successfully demonstrated in a combat situation with targets been destroyed at the different range and different altitudes by the Su-30MKI which will be first to get them followed by Mig-29UPG and LCA-Tejas Mk1A.

While DRDO officially has been tight-lipped about next-generation Astra, it's more or less has been confirmed that Astra Mk2 will have longer range and will have a higher fuel capacity along with a new conventional motor which will be designed to match or be superior to American AIM-120D and Chinese PL-15 missile long range Air-to-Air missiles, which for the first time has been confirmed to idrw.org that the range will be approx 160-180 km while the actual range of the missile will remain classified.



Astra Mk1 has demonstrated capabilities similar to the American AIM-120C5 AMRAAM in trials and has demonstrated similar max range too, Astra Mk2 will be built around capabilities of the AIM-120D aka C8 which is far superior to the C5 capabilities along with a range of 160-180 km. Astra Mk2 will come with improved High-Angle Off-Boresight, Improved Jammer resistance with Dual-Pulse motor for an increased sustained range which will also carry an expanded no-escape envelope for the missile.

While the timeline of the missile system has never been disclosed it can be safely assumed that the missile will be ready before SFDR (Solid Fuel Ducted Ramjet) aka Astra Mk3 is ready for production in next decade or so. SFDR aka Astra Mk3 will have a range from 70-340 km in the power 'ON' Mode which will come with Air-breathing ramjet propulsion technology, while Astra Mk2 will be based on conventional Dual-Pulse motor with thrust vectoring control.

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<https://idrw.org/astra-mk2-will-be-superior-to-aim-120d-and-pl-15-missile-source/#more-230919>

Tue, 14 July 2020

Confident of Indian Army's Capability to thwart misadventure by enemies: Chief

The COAS visited forward areas falling under the operational command of the Rising Star Corps in Jammu and reviewed security situation and operational readiness of the troops deployed on ground in Jammu-Pathankot region

The Chief of Army Staff (COAS), General MM Naravane said Monday he has complete confidence on Indian Army's capabilities to thwart any misadventure "by the enemies of our country and handle any situation."

The COAS visited forward areas falling under the operational command of the Rising Star Corps in Jammu and reviewed security situation and operational readiness of the troops deployed on ground in Jammu-Pathankot region, defence spokesperson Lt Col Devender Anand said.

The Army Chief was received in Jammu by Lt Gen RP Singh, GOC-in-C Western Command, Lt Gen Upendra Dwivedi, GOC Rising Star Corps, Maj Gen VB Nair, GOC Tiger Division and Air Cmde AS Pathania, AOC, AF Stn Jammu.

The COAS was briefed by Lt Gen Upendra Dwivedi, GOC, Rising Star Corps on the operational preparedness, up-gradation of security infrastructure and the internal security matters. The Army Chief accompanied by GOC Tiger Division reviewed operational preparedness in forward areas.

He interacted with the field formation Commanders and troops on ground during forward area visit. The General also visited the forward areas of Gurj Division and was briefed by Maj Gen YP Khanduri, GOC Gurj Division.

The Army chief reinstated the fact of 'zero tolerance' against the ceasefire violations by Pakistan and infiltration attempts by militants, the spokesperson said.

He said the COAS highlighted that all agencies of the services and govt are working together relentlessly and will continue to do the same to defeat the nefarious design of "proxy war being fuelled by our adversaries." "The Army Chief addressed all ranks of Western Command through video conferencing and lauded the morale of the troops. He expressed complete confidence in Indian Army's capabilities to thwart any misadventure by the enemies of our country and handle any situation," the spokesperson said.

Gen Naravane He also commended the efforts of all the formations of the Western Command in the fight against the COVID-19 pandemic by supporting the ongoing 'Op Namaste'.

<https://www.outlookindia.com/website/story/india-news-complete-confidence-in-indian-armys-capability-to-thwart-misadventure-by-enemies-army-chief/356602>



Army chief Manoj Mukund Naravane inspects guard of honour during Army Day celebrations at Cariappa Parade Ground in New Delhi.

US UAV, Israeli loitering bombs as Indian infantry gets lethal

The Indian army is set to acquire 200 pieces of RQ-11 UAV, which can fly up to 10 kilometers at an altitude of 500 feet and speed up to 95 kilometre per hour

By Shishir Gupta

New Delhi: The Indian army has set its eyes on acquiring hand-launched, remotely controlled unmanned aerial vehicle Raven from US and state-of-the-art Israeli Spike Firefly “loitering” ammunition to add lethality to its ground infantry apart from long-range precision artillery shells with a range of over 40 kilometres.

While the army is sharpening the teeth of its infantry, the air force will get five Rafale multi-role fighter jets from Paris this month, with another four to be used for training in France. The five fighter jets will be based at Ambala.

The Indian navy is all set to commission its second ballistic missile-firing nuclear submarine, INS Arighat, later this year.

According to people in South Block aware of the development, the army is set to acquire 200 pieces of RQ-11 UAV, which can fly up to 10 kilometers at an altitude of 500 feet and speed up to 95 kilometre per hour, to help infantry troops conduct reconnaissance of the battle theatre ahead and placement of enemy troops.

After the Indian army brought Spike Mark III anti-tank guided missiles from Israel as part of emergency purchases due to the Ladakh standoff with China, it is now buying firefly ammunition that can deliver a precision strike on enemy troops hiding within a range of one km.

The latest Firefly ammunition not only has loitering capability to locate a target but also can be called back if the target has moved beyond range.

While the IAF and Indian Army have been at the forefront of the Indian posture in Ladakh, the Indian Navy has been on the front foot in the Indian Ocean against Chinese warships.

According to senior military officials, the Navy through its Fusion Centre at Gurugram, has kept a close watch on the Indian Ocean throughout the Ladakh crisis and has been able muscle out six Chinese warships from the Arabian Sea and Indian Ocean region.

“These ships were around Gwadar port in Balochistan. First three ships went back to China with Indian Navy closely watching them and then the remaining three also returned to their home country. Today, there is not a single Chinese warship in Indian Ocean,” said a senior military officer on condition of anonymity.

While the senior military commander talks on disengagement in Ladakh will take place this week, the troop withdrawal exercise from all the four stand-off points is currently on with verification on the ground.

While the Chinese People’s Liberation Army has tried to link the withdrawal with other conditions, Indian army commanders have made it clear that the disengagement is unconditional.

<https://www.hindustantimes.com/india-news/army-looks-to-acquire-us-aerial-vehicle-to-strengthen-infantry/story-vY4Cn0fZDAofyij2b0LvbN.html>



The Indian Army is set to acquire Spike firefly ammunition that can deliver a precision strike on enemy troops hiding within a range of one km. (Reuters)



Tue, 14 July 2020

Extra Su-30s and Mig-29s but why not Mirage-2000s for IAF?

By Satyajeet Kumar

The procurement process for an additional 21 Mig-29 and 12 Sukhoi Su-30MKI which IAF will start getting in the next three years. Purchase of additional Mig-29 and Su-30 to argument current fleet and also buff up aircraft lost in the accidents over the years is a cheap and effective way to stabilize your fleet numbers which have been plummeting due to lack of procurement of newer fighter jet in last two decades.

A question that often crops up of late is why IAF is not planning to procure extra Mirage-2000s? Why the Poster Boy of Kargil war and Balakot Air Strikes is not been procured, actually IAF has been in talks with its counterparts in French Air Force to procure two additional conversion two-seater trainer jets to replace two trainers which were lost in previous accidents but that's where the bucks stop and this could be last



purchase after IAF procurement of 10 Mirage-2000 planes in 2004, taking the total tally to 50 jets.

The Mirage-2000 is undoubtedly one of the Indian Air Force's (IAF) most versatile and deadliest aircraft and In 2012 all of them were contracted to be upgraded to Mirage 2000-5 Mk. 2 standards. France, the United Arab Emirates, and Taiwan are the three biggest operators of the Mirage-2000 Type fleet and all three of them are keen to hang on to them till they are retired. Qatar due to external pressure wanted to get rid of 12 Mirage-2000-5 a few years ago but India and France were not able to get a deal due to price difference.

Brazilian Air Force (FAB) tried to sell 11 of the 12 Dassault Mirage 2000 fighters deactivated in December 2013 but finally managed to sell nine of the 11 Mirage 2000 fighters to a Private company but has now decided to put back only one jet up in the air after their grounding in 2013. France had asked India to look into their purchase since FAB was asking \$ 2.5 million for eight units, but the lack of interested parties made the government lower the price last year to \$ 508,600 and increase the number of airplanes to eleven but India didn't engage with FAB on the purchase.

IAF was told that airframe life had exceeded the 10,000-hour limit but airframe still exhibited a high degree of integrity and exhibited a high degree of reliability to press on for guaranteed additional 2,500-4000 hours minimum after deep overhaul but IAF after careful consideration about price and additional modernization cost factored in it was decided to better walk away.

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<https://idrw.org/extra-su-30s-and-mig-29s-but-why-not-mirage-2000s-for-iaf/#more-230869>

Domestic arms makers say Army plan to reorder SIG rifles from US setback to ‘Make in India’

Army's fresh order for SIG assault rifles would mean over 1.4 lakh rifles will be bought off the shelf from US despite a domestic industry that manufactures a range of assault rifles

By Snehesh Alex Philip

New Delhi: The Army's decision to go ahead with a second order of 72,000 SIG 716 assault rifles from the United States is yet another “setback” to the private small arms industry in India, and sharpens focus on the government's inability to kickstart the AK 203 production factory in Amethi.

When the order for the SIG assault rifles is placed — under the option clause of the original contract signed for 72,400 rifles — it would mean that over 1.4 lakh 7.62×51 mm rifles in total will be bought off the shelf from abroad without a ‘Make in India’ initiative.

The domestic industry said the Army's decision isn't surprising, but is indeed a setback to them and doesn't align with the government's *aatma nirbharta* (self reliance) push. For now, domestic manufacturers are placing their bets on the Central Armed Police Forces (CAPF), special forces and the state police, besides the export market for their range of assault rifles.

Defence sources said the SIG assault rifles procurement had to do with a weapon already in service with troops. The fact that an option clause was part of the deal means the plan was always to buy more rifles, depending on the feedback and necessity.

On the ‘Make in India’ initiative, a source said it was being promoted through the AK 203 manufacturing factory, which is expected to be the mainstay of the armed forces. The source added that there are several other tenders in the works in which private domestic players are participating.

The Indian Army had been trying to replace their standard INSAS assault rifles for many years but has been unable to do so due to varying factors.

The second batch of SIG rifles will arrive after the delivery of the first order this year, which was placed through the Fast Track Process (FTP). The option clause allows the Army to reorder the rifles for the same price within a similar delivery time-frame.

The new rifles will go to troops in the Northern Command and other operational areas, while the rest of the troops will be equipped with AK 203.

However, the SIG order draws attention to the fact that the government has not been able to start production of AK 203 rifles, chambered to fire 7.62×39 mm ammunition (same as the AK-47), at the Amethi factory that was inaugurated by Prime Minister Narendra Modi last March.

The Indo-Russia Rifles Private Limited, established between the Ordnance Factory Board (OFB), Kalashnikov Concern and Rosoboronexport, the Russian state agency for military exports, has seen a delay in starting production.

Earlier this year, the defence ministry had formed a committee to work out the cost of the AK 203 since the Russian partner and OFB are yet to arrive at an agreed price.

Domestic industry unhappy

A source in the defence industry said that when the Army suddenly decided to acquire AK 203 under a government-to-government initiative in 2018, it was the first blow. The SIG rifles deal was also a “setback” for private manufacturers.



Image: An indigenous rifle by SSS Defence | Ramandeep Kaur | ThePrint

“The Army’s decision to order for another tranche of rifles from the US is not surprising but is indeed a setback. A number of companies in India have come up with their own rifles and other systems or tied up with foreign companies and set up manufacturing facilities,” the source said.

A second source said, “The arms manufactured by India have to go through multiple tests. From summer trials to winters to high altitude and desert. However, under the FTP model, the foreign manufacturer shows off the ability in their own factory and is selected under emergency clause.”

A third source said, “The talk now is of ‘Make in India’ and ‘Atmanirbartha’. But when domestic industry is offering world-class rifles, the focus is still on procuring from abroad. Do note that the 1.4 lakh rifles from US will be straight import without any Make in India or technology transfer.”

Domestic manufacturers up their game

One of the early companies to set up an arms manufacturing plant in India was PLR Systems in a tie-up with Israeli Weapons System (IWI).

Under the deal, the companies began producing weapons like Tavor series, the mainstay of the special forces in India, along with others like the Galil sniper rifle, Uzi Pro submachine gun, Masada pistol and the Negev Light Machine Gun (LMG) with indigenous content ranging from 40-60 per cent.

In case of a repeat order, though, it is sent to IWI directly instead of the local manufacturing unit since there will be a change in the name of the firm.

“This means that there will have to be fresh trials even when it is the same rifle manufactured in India with a large indigenous component,” a third source said.

Bengaluru-based SSS Defence is another company in the domestic market. The company manufactures a sniper, assault rifle and light machine gun.

The rifles are completely indigenously designed, with SSS Defence holding the Intellectual Property Rights for its design.

Bharat Forge of the Kalyani Group also works in the small arms market and has tie-ups with a foreign player for indigenous manufacturing for an Army contract bid.

Army’s quest for assault rifles

In 2011, the Army issued a global tender for procurement of assault rifles wherein Colt of United States, Beretta of Italy, IWI of Israel and Ceska of Czeck Republic participated.

However, this attempt failed since only the IWI weapon qualified the trials and was declared the resultant single vendor.

The Armament Research and Development Establishment (ARDE), DRDO and OFB also tried to design and develop assault rifles to replace the INSAS. However, none of their weapons made the cut.

Yet another Request for Proposal (RFP) for procurement of assault rifles was issued in 2017 with assurance of a floating RFP in 2018.

Given the situation, it was felt that a certain quantity of rifles needed to be procured on an urgent basis for the frontline troops.

Accordingly, the Indian Army planned to procure 72,400 assault rifles of Calibre 7.62x51mm through the Fast Track Process route.

Later, the Army backed the idea of manufacturing AK rifles jointly with Russia, a project that the Russians had been pushing for a while.

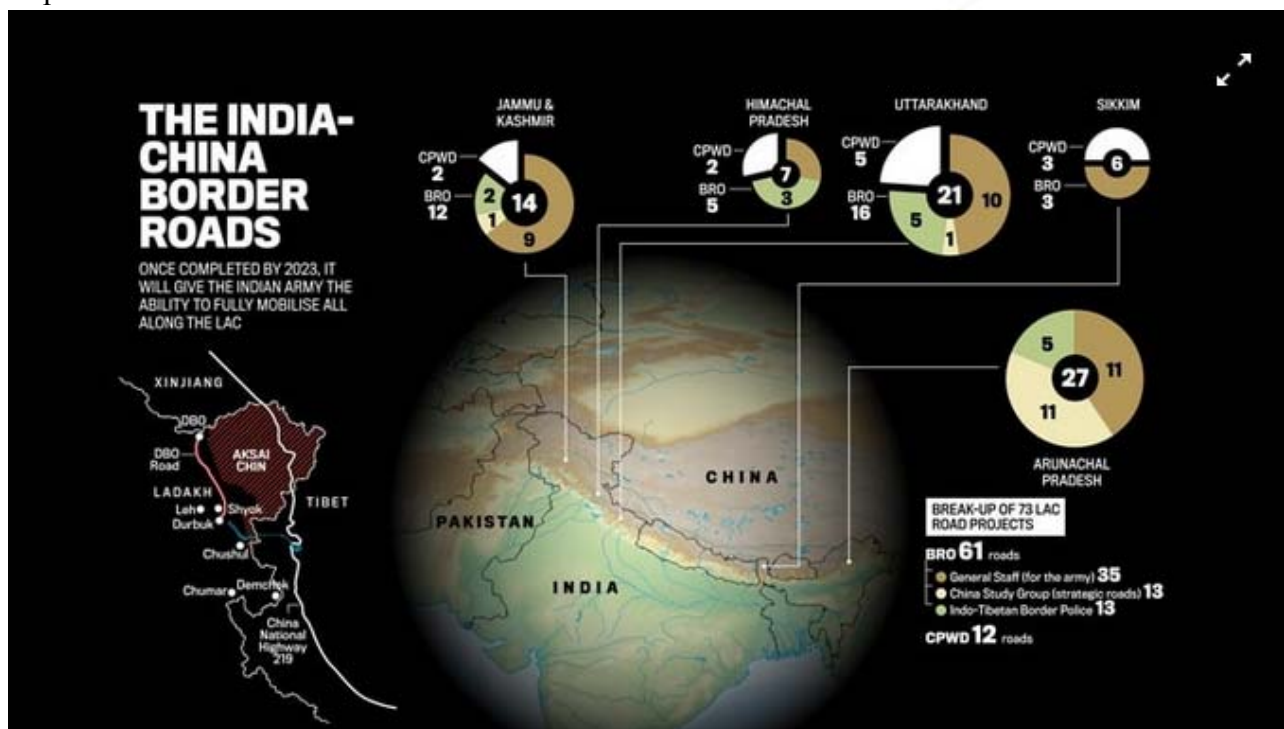
<https://theprint.in/defence/domestic-arms-makers-say-army-plan-to-reorder-sig-rifles-from-us-setback-to-make-in-india/459899/>



Tue, 14 July 2020

Build up on the border

Sometime in late April, two Chinese motorised divisions, over 20,000 soldiers in trucks, equipped with light tanks and self-propelled howitzers, left their exercise area at the edge of the Gobi desert in Hotan, Xinjiang, and hit the ‘Sky Road’. The Xinjiang-Tibet highway is thus called because it is one of the world’s highest motorable roads, with an average altitude of 4,500 metres. From here, these divisions branched off towards a series of feeder roads that took them right up to the Line of Actual Control (LAC) with India. Once these formations were in position along the 480-km stretch in eastern Ladakh, the People’s Liberation Army (PLA) of China began Phase 2 of their military plan, triggering incursions across the LAC in four locations using small batches of troops.



The PLA force was insufficient for a full-fledged invasion (for which they would need between four and six divisions) of Ladakh but just enough to block any attempt at militarily evicting them. The Indian Army rushed two infantry divisions to beef up the Leh-based 3 Division even as the IAF flew in fighter jets and helicopter gunships as deterrents. The counter deployment rode on freshly topped strategic roads and bridges built in the biggest post-Independence burst of infrastructure-building, over 4,700 kilometres, along the disputed frontier.

The largest military standoff between the Asian giants since the 1962 war culminated in a violent clash on June 15 which claimed the lives of 20 Indian soldiers and an unspecified number of their PLA counterparts. A two-hour phone call between National Security Advisor Ajit Doval and Chinese foreign minister Wang Yi on July 5 saw both armies begin the process of stepping back or ‘de-escalating’.

On July 7, just hours after the de-escalation began, defence minister Rajnath Singh asked Lt General Harpal Singh, director-general, Border Roads Organisation (BRO), to expedite the existing projects along the LAC, road infrastructure, 30 permanent bridges and tunnels worth Rs 20,000 crore. The directives to the MoD’s road construction agency was a clear signal from the

government—de-escalation did not mean the foot was being taken off the infrastructure pedal. “Our work did not stop through the standoff, we’ve in fact accelerated construction,” says a senior government official. The BRO is also flying in road construction workers from states like Jharkhand to achieve their expedited targets this year. Intense construction over the past decade has brought Indian trucks, battle tanks, infantry combat vehicles, artillery, Brahmos missile trucks and road-mobile Agni ICBM launchers close to the border.

“India’s armed forces have the capability to move into multiple sectors at one go,” Prime Minister Narendra Modi said in his June 19 address at an all-party meeting. India’s infrastructure push, well within its side of the LAC, is a frantic and belated attempt to match the Chinese construction on the plateau. The BRO’s budget was more than doubled—from Rs 5,500 crore in 2017-18 to Rs 11,300 crore in 2020-21.

One of the many reasons analysts have attributed to the PLA’s move is a message to halt the Indian build-up. The most crucial project to have been completed so far, the 260-km Darbuk-Shyok-Daulat Beg Oldie (DSDBO) road is, as an MoD briefing note calls it, ‘highly sensitive and critical for army formations in the area’. The all-weather road with multiple bridges cuts journey time between Leh and Daulat Beg Oldie (DBO), the northernmost outpost, from a week to three days.

In a June 19 article on news portal warontherocks.com which was widely read by India’s security establishment, Yun Sun, senior fellow and co-director of the East Asia Program at the Stimson Center, argued that the Chinese saw Indian infrastructure development ‘as a consistent and repeated effort by Delhi that “needs to be corrected every few years”’. ‘For the Chinese,’ it goes on to say, ‘the infrastructure arms race in the border region has enabled the repeated incursions and changes to the status quo and therefore needs to be stopped. Otherwise, all the things China fought for in the 1962 war would have been in vain.’

The Infrastructure Race

The India-China border dispute began when the PLA’s takeover of Tibet in 1950 turned the two countries into neighbours for the first time in history. In 1951, Chinese road crews started hacking their way through the desolate Aksai Chin, completing the gravel-topped Xinjian-Tibet highway to link the People’s Republic of China’s two newest acquisitions in 1957. The discovery of the road running through territory claimed by India was one of the triggers for the 1962 border war. India’s ‘Forward Policy’ riposte, sending soldiers to man small pickets on its territorial claims, was doomed among several other things by the utter lack of border infrastructure in the Himalayas. Mules, transport aircraft and helicopters could not substitute non-existent roads. The military post in the now infamous Galwan Valley, for instance, one of dozens set up before the war, had to be supplied by transport aircraft before it was overrun by the PLA in October 1962. After the war, the borders lay largely undisturbed and lightly patrolled for nearly three decades. Infrastructure was given a miss, deliberately, as it would emerge in a 2013 statement made by then defence minister A.K. Antony in the Lok Sabha. “Independent India (for) many years had a policy, the best defence is not to develop the border.”

The more recent awareness on the need for connectivity along the disputed boundaries came, not from the China border, but from the opposite side. A key part of General Pervez Musharraf’s Operation ‘Koh-Paima (Call of the Mountains)’ in 1999 saw the Pakistan army dragging howitzers atop mountaintops near Kargil to shell and cut off the Srinagar-Leh highway that supplied the Indian army’s garrison in Siachen. The Indian army forced the Pakistan army to roll back in the Kargil War. Shortly after the conflict, the cabinet committee on security in 1999 approved the speedy construction of 13 border roads.

This was around the time that a rising China’s economic muscle began manifesting along India’s LAC. By 2006, a latticework of 36,000 miles of black-topped roads swathed the Tibetan plateau. The crown jewel was the 1,956-km-long Tibet-Qinghai railway line with foundation pillars sunk into permafrost and coaches pressurised to acclimatise passengers when they arrived. The implication to Indian military planners was clear, the PLA could now bring in 30 divisions, tanks and artillery into the Tibetan theatre in days as opposed to months. The railway marked the

start of a policy of transgressions by the PLA along the border which began in 2006 and continued for several years, culminating in May 2020 as a larger military game plan to alter the LAC.

In her 2018 MIT doctoral thesis, 'Calculating Bully: Explaining Chinese Coercion', the scholar Ketian Zhang holds the 2006 completion of the railway as 'the most important factor contributing to increased Chinese transgressions'. China's infrastructure in the border regions had dramatically improved to the extent that many roads could reach areas merely five or 10 kilometres from the LAC which makes it easier for border forces to patrol along the area, Lin Minwang, a former diplomat at the Chinese embassy in New Delhi, was quoted as saying in the thesis.

The UPA government signed off on the border infrastructure boost in 2006 with its 'China Study Group' headed by the NSA, setting ambitious targets to complete 61 Indo-China Border Roads (ICBRs) across the various Indian states facing the LAC by 2012 (see graphic). The BRO, however, was unable to deliver.

A CAG report tabled in Parliament in 2017 noted that only 15 of the planned 61 roads had been completed. The projects had incurred massive cost overruns, 98 per cent of the Rs 4,644 crore estimate had been swallowed in building just 22 roads. Only seven of 46 roads were complete by March 2016, with the deadline for the remaining ones extended to 2021.

There were various reasons for this, chief among them being the peculiar structure and diffused accountability of the BRO. Created in 1960, it built roads for the military but was under the Ministry of Road Transport and Highways (MoRTH). Its inhouse General Reserve Engineer Force cadre sparred with army engineers who manned the BRO. "An agency created with a unique character lost its uniqueness and envisaged efficiency, it had dual controls, it was under the administrative control of the MoD but the MoRTH released its funds," says Colonel D.P.K. Pillay (retired), a military analyst with the Manohar Parrikar Institute for Defence Studies and Analyses (IDSA).

Add to that were the natural obstacles of building roads along the world's highest mountain range. "Building roads in the Himalayas is like building on a heap of loose, sedimentary rock that has faultlines, is earthquake prone and bears the brunt of the monsoons," says Lt General S. Ravi Shankar, former D-G, BRO.

The heavy winter snowfall constricted road building into a single six-month window between May and October. The Chinese, in sharp contrast, have the natural advantage of building their roads on the plateau that is flat and hence more amenable to construction. Huge shifts had already started taking place within the MoD, army and BRO even as the CAG's alarming report was tabled in Parliament. The biggest change summed up by an unnamed army officer in a 2016 deposition before the Lok Sabha's standing committee on defence was "the philosophy of not making roads as near to the border as possible had been changed to 'we must go as far forward as possible'".

A prescient MoD briefing note to the standing committee that year warned of a long-term infrastructure development plan by both China and Pakistan in the northern areas. 'These plans will enable these countries to concentrate and move sizeable forces all along the Indian border and will pose a significant threat in the event of any conflict,' it said.

The changes began in November 2014 with the induction of the technocrat defence minister Manohar Parrikar, who was laser-focused on transforming border infrastructure. The BRO was placed under the MoD in January 2015 and closely integrated with the army and defence ministry.

"The biggest changes in the BRO were the induction of tunnel boring machines, constant review meetings and the delegation of financial powers to speed up decision-making," says G. Mohan Kumar, then defence secretary.

The BRO began working in mission mode, the D-G reporting to then army chief General D.S. Suhag and defence secretary Kumar. "We worked on transformative change, to institutionalise monthly consultative meetings among all the stakeholders and iron out differences," says Lt General Suresh Sharma, then D-G, BRO.

A new category of 'Priority 1' roads was created on the advice of the Director General Military Operations, the key army Lt General officer responsible for military plans. The DSDBO road was

one of them. The road had defied attempts at construction given the tricky terrain, especially the crossing over the Shyok river which overflowed with snowmelt during summers. The BRO, for the first time, used micro-piles—high performance, high capacity foundations around 12 inches in diameter, to build a 430-metre-long bridge across the river. It was completed last year.

The organisation also began tunneling in a major way. A tunnel under construction will reduce travel time from the Indian Army's 4 Corps headquartered in Tezpur, Assam, to Tawang, a town claimed by China, by at least 10 km and, more importantly, convert a normally snowbound highway into an all-weather road when it is completed next year. The strategic 8.8-km-long Atal tunnel being built for Rs 4,000 crore will shorten the Leh-Manali route by 46 km and will be open to traffic this September.

The 72-day Doklam stand-off between the two armies in 2017 was another major factor that speeded up road construction by the BRO. The stand-off began over a road that the PLA began constructing towards a vital ridge overlooking Indian territory and which the Indian army successfully blocked. By 2018, the BRO had constructed a second road to the disputed valley, converting a mule track into a motorable road and is building a third one to be completed by 2021. New techniques like building a road at five 'attack points' were used to hasten completion of the strategic 80-km Ghatiabagarh-Lipulekh road near the Indo-Nepal border, inaugurated by Rajnath Singh on May 10.

More importantly, the ICBRs were brought under a five-year works plan, where the BRO would prepare estimates without waiting for specific approvals from the government. The present works plan approved in 2018 is for 282 roads of 22,803 km (including the ICBRs) at a cost of Rs 22,000 crore, and is set to be complete by 2023 which would see India finally catching up with China. The Himalayan race seems poised for an exciting finish.

<https://idrw.org/build-up-on-the-border/#more-230914>



Tue, 14 July 2020

Caught between Indian and Chinese troops, at 15,000 feet

First it was cellphone towers, new roads and surveillance cameras, popping up on the Chinese side of the disputed Himalayan border with India. Then it was more run-ins between troops on each side, pushing, shoving and eventually getting into fistfights. Then, about three years ago, Indian soldiers spotted their Chinese foes carrying iron bars with little numbers written on them — a weapon apparently issued as standard gear, and a sign that the Chinese were gearing up for hand-to-hand combat. "This is how China operates," said J.P. Yadav, a recently retired official with the Indo-Tibetan Border Police, on the Indian side.

"These are very planned things." Now, weeks after a deadly brawl erupted along the border, thousands of Chinese and Indian troops are amassed over a contentious, jagged line in one of the most remote places on earth. Satellite photos reveal a major Chinese buildup, including a blizzard of new tents, new storage sheds, artillery pieces and even tanks.



Each country has accused the other of provocative actions along the murky border. But according to people who live and work in the region, Ladakh, a Chinese push into Indian territory has been building for years.

The area, high up in the Himalayas, has little obvious strategic value, few resources and few people — it's difficult to even breathe up there, with much of the terrain above 15,000 feet. But India and China, both in the grip of increasingly nationalistic governments, will not give an inch of territory, even along a border so remote that it has never been conclusively mapped. The Ladakhis caught in between are a fragile group, numbering perhaps a few hundred thousand. They are Tibetan in culture, identify themselves as Indian and have long been pulled in different directions at the edges of empire. "If we don't speak now, it will be too late," said Rigzin Spalbar, a Ladakhi politician. "The Chinese have intruded and encroached on our land. Even the media is not telling the truth. They are only showing the things that the government wants to them to show."

Spalbar and other prominent Ladakhis insist that they have reported Chinese incursions for years, but that the Indian military refused to do anything about it. They say there was a code of silence, in which the Indian media was complicit, and that the Indian armed forces didn't want to face the fact that a more powerful and aggressive military was steadily nibbling away at its territory.

Indian Army officials declined to comment for this article. Chinese officials have been stingy with details as well, including about whether any Chinese troops were killed in the clash in June. Western intelligence agents, who see the border as one of Asia's most dangerous flash points, say they think that China lost more than a dozen soldiers in the fight.

In early July, Prime Minister Narendra Modi of India swooped into Ladakh, rallying the troops while wearing a puffy green army jacket and aviator-style shades.

"Friends," he vowed, "the era of expansionism is over," implying that India was willing to push back against China.

Years ago, the two countries agreed that their troops should not shoot at each other during border standoffs. But the Chinese seem to be testing the limits. In the June fighting, which left 20 Indians and an unknown number of Chinese dead, Indian commanders say that Chinese troops used iron clubs bristling with spikes.

Many analysts say that China's actions in Ladakh mirror the more assertive approach China has taken across Asia, especially in the South China Sea, since its leader, Xi Jinping, took over in 2012.

And Modi's brand of renewed Indian nationalism may also have provoked the Chinese. The Indians, too, have also been building military roads along the disputed border, known as the Line of Actual Control. And Indian officials recently promised to take back Aksai Chin, a high-altitude plateau that India says is part of Ladakh but that China controls and claims as its own.

Aksai Chin is "a very important strategic place" to the Chinese military, said Yue Gang, a retired colonel in the People's Liberation Army. If India were to seize it, he said, it "would cut the transportation between Tibet and Xinjiang," two restive areas that China is constantly concerned about.

In culture, language, history and Buddhism, Ladakh is close to Tibet. But Ladakhi scholars are firm about one thing: They don't want to be part of China.

"Ladakhis see themselves as Indians," said Sonam Joldan, a Ladakhi political scientist.

Up until a few years ago, Ladakhi and Tibetan nomads roamed freely, pushing their herds of goats, sheep and yak across the lonely, high-altitude plains. They used to converge along a stretch of the Line of Actual Control and barter.

The Ladakhis carried Indian products like basmati rice; the Tibetans brought Chinese-made goods like plastic Thermoses. The trading sessions ended, Ladakhis say, after Chinese troops occupied the area.

This is hardly the first time that Ladakh has been swept up into geopolitics.

In the mid-19th century, the British helped set up the princely state of Jammu and Kashmir, which seems to stretch endlessly across the Himalayas. The British, who controlled the Indian subcontinent, believed that the bigger the buffer zone against the Russian empire, the better.

So they allowed the maharajah of Jammu and Kashmir to also grab neighboring Ladakh, enabling him to corner the lucrative trade in pashmina wool. This part of Asia is known for its cashmere (the word for which is derived from Kashmir), and Ladakh's longhaired Changthangi goats produce especially fine pashmina.

But even after several treaties were signed, the border between Ladakh and China was never neatly defined. It snakes across high mountains that few people have ever climbed.

"There were different narratives during the British times," said Siddiq Wahid, a scholar of Central Asian history. "Aksai Chin was a part of a Tibet, and it was not a part of Tibet, it was part of Ladakh and not part of Ladakh."

Shortly after India gained independence in 1947 and Pakistan was created, war erupted between the two countries over Jammu and Kashmir. The princely state, which had hoped to stay independent, hurriedly agreed to be part of India, and thus Ladakh became Indian.

In 1950, China invaded Tibet and soon built a road linking it to Xinjiang, slicing through Aksai Chin. The area was so desolate that it wasn't until several years later that India even found out about the road. This triggered a brief war in 1962 that ended in a disastrous loss for India, and China seized all of Aksai Chin, more than 14,000 square miles.

By the mid-1970s, things had cooled down, at least on the China front. A protocol evolved between Indian and Chinese troops, including a ban on firearms during border standoffs and regular meetings to iron out disputes.

Things were still hot with Pakistan, though. The same piece of territory, Jammu and Kashmir, has propelled India into repeated conflicts with both Pakistan and China — two nations which, like India, have nuclear arms today.

Indian soldiers who served along the China border in the 1980s and 1990s remember friendly interactions with the Chinese troops.

"We used to shake hands and they would take photos with us and we would take photos with them," said Sonam Murup, a retired officer.

Those visits with the Chinese were welcome distractions. Soldiers stationed along the border had to tramp around a frozen moonscape for weeks, with little food or water.

"We'd wash our face once maybe every 15 or 16 days," Murup recalled.

But the bonhomie with the Chinese ended years ago. Ladakhis say Chinese troops have blocked herders' access to Indian territory in areas like Demchok and Pangong Tso, a scenic lake where several brawls have erupted.

Indian officers say they have tried to follow protocols for avoiding confrontation, like unfurling banners that read "This Is Indian Territory" in English and Chinese, but that the Chinese refuse to listen. Indian commanders acknowledge that their soldiers, too, now carry hand weapons, like bamboo sticks and sling shots.

The Chinese have clearly outpaced India in developing the region, Indian commanders concede, which could give them a strategic advantage in a conflict.

"They have better facilities," said Yadav, the former border official.

He said that China had paved a highway running right along the border and that Chinese border troops were resupplied by military vehicles carrying supplemental oxygen.

But Yadav said the Indians had some advantages. He claimed the Chinese troops were in poorer shape, saying, "They don't walk much."

More important, he added: "They have not seen war, while on our side our soldiers have been waging war every day in Kashmir."

<https://www.defencenews.in/article/Caught-between-Indian-and-Chinese-troops,-at-15,000-feet-871588>

Stealth vs Thrust: Why Indian Air Force needs American jets instead of Russian aircraft?

For the US and much of the world, the stealth fighter jets – F-22s and F-35s indicate US air dominance and prowess. However, with the arrival of ‘highly manoeuvrable’ SU-57, the Russians are confident that they can challenge US dominance

The Indian air force is in the process of a major overhaul. Recently, at the height of India-China border conflict, Indian defence minister Rajnath Singh flew to Russia and signed a \$2.3 billion deal for Russian jets which included 21 MiG-29s and 12 Sukhoi Su-30MKIs.

Many experts have questioned whether the Russian jets operated by the Indian air force can overwhelm Chinese planes which are mostly modelled on Russian technology?

According to Nitin J Ticku an expert with the EurAsian Times, the difference between the US and Russian jets lies in two fundamentally different approaches to aerial combat and New Delhi needs to make a pick.



In conversation with the EurAsian Times, Nitin J Ticku argue that compared to US fighter jets, the Russian Air Force fighter planes usually have a higher thrust and, as a result, better manoeuvrability.

The Russians still consider mid-range or short-range air combat relevant, so their basic concept is to make their jets competent in super-manoevrability, a role that might be overrated.

For instance, if the most advanced Russian jets like Su-57 or Indian air force operated Su-30MKI gets detected by enemy radars or is unable to detect stealth or semi stealth enemy jets, the thrust or manoeuvrability factor is of no use, Ticku argues.

US Stealth vs Russian Thrust

For the US and much of the world, the stealth fighter jets – F-22s and F-35s indicate US air dominance and prowess. However, with the arrival of ‘highly manoeuvrable’ SU-57, the Russians are confident that they can challenge American dominance.

In fact, the Russian are so confident that they named the ‘SU-57’ because it combines the best of both F-22 and F-35 and if you add the suffix for both the planes you get 57.

As expected, Russia has kept the details of the aircraft under wraps but leaked reports on the internet do give some interesting insights. Experts believe the SU-57 is an evolution of the SU-27 Flanker’s shape, modernized for low radar observability but also even greater manoeuvrability.

Aviation author Piotr Butowski claims that its high static instability makes it more manoeuvrable than any modern fighter plane. The blended wing design increases internal volume for avionics, fuel and weapons.

The major component of the SU-57’s performance is its two engines. The Saturn izdeliye 30 engines are each meant to generate between 24,054 and 35,556 pounds of thrust, with the high end in the same territory as the F-22’s F119 engines.

These are meant to drive the fighter to speeds of up to Mach 1.5 in supercruise. The SU-57 will equip with the N056 Byelka (“squirrel”) radar system and the L402 electronic countermeasures suite. L-band arrays will be the fighter’s primary means of detecting stealth aircraft, while at shorter ranges the 101KS Atoll electro-optical suite, including an infrared search and track system, will help the pilot track and engage targets with infrared-guided missiles.

In comparison to the F-22 Raptor, the SU-57 has two large internal weapons bay. Each bay can carry up to 4 K-77 M and the K-74M2 missiles. The former is a beyond visual range radar-guided missile and has the capability to engage agile targets up to a 100 miles.

Experts write that the SU-57 is thoroughly inclined towards manoeuvrability and speed while its counterparts in the US rely primarily on the stealth factor, making them almost invincible.

The US jets clearly get an advantage as they can detect ‘highly manoeuvrable’ Russian aircraft early and counter it without showing on its radar. Experts argue that if India has to counter the PLAAF (Chinese air force) India needs more western, especially US jets that can outgun any aircraft in the region.

This was recently acknowledged by China after the US recently approved the sale of F-35 joint strike fighters to Japan. China, via its media, expressed serious concern of having such advanced aircraft in the region which could severely impact the security of both China and Russia.

<https://eurasianimes.com/stealth-vs-thrust-why-indian-air-force-needs-american-jets-instead-of-russian-aircraft/>



Tue, 14 July 2020

China's laser weapon capable of destroying Indian and US satellites, say analysts

By Manish shukla

The Indian and US satellites are vulnerable to China's ground-based lasers as according to some analysts China has acquired the full capability to destroy the enemy's satellite sensors through its lasers. China can cause great damage to Indian and US satellites during wartime. In January 2019, the Pentagon's Defence Intelligence Agency (DIA), in a report on space threats, had disclosed and warned that China's military is expected to deploy a laser weapon capable of destroying or damaging US military satellites in low earth orbit next year (2020).

Experts have identified one such laser station is Xinxiang, which has four buildings. While one of these buildings has satellite tracking systems and the other three could have been used to damage satellite sensors. China has also established five fixed ranging stations which are Shanghai, Changchun, Beijing, Wuhan and Kuming and the other two are mobile raising stations which can be transported from one place to another, as per their operational requirements. The ranging stations are mainly used for tracking satellites and space debris but it can also be used for damaging enemy satellites.



Representational Image

The report, “US Satellites increasingly vulnerable to China's ground-based lasers” published in Spacenews reveals. “The ranging system at the Shanghai station uses a laser with a relatively low average power of 2.8 watts. The wattage at other stations is most likely the same or lower. Another laser of 60 watts at the Shanghai station has been used routinely to measure space debris. Calculations show that a one-watt laser has a one in 1,000 chance to cause permanent damage to a sensor, while a 40-watt laser would double the chance. These odds are low but likely to increase.”

As per the DIA report, the Chinese directed-energy weapon is among several space warfare tools that include ground-based anti-satellite (ASAT) missiles, electronic jammers, cyber attacks, and small satellites that Beijing plans to use in attacks on US satellites in a future conflict. This

DIA report is the first time a US intelligence agency disclosed details of the anti-satellite (ASAT) laser deployment plans.

Due to the growing anti-satellite threat from China, in 2019 India also demonstrated its capability by successfully testing an anti-satellite weapon in space. The Anti-Satellite Weapon System (ASAT) is a capability that only the US, Russia and China possess so far. These can be used to either destroy or interfere with targeted satellites in space--either enemy or defunct and can be fired from air, land or sea.

China became only the third country to join the ASAT club in 2007 when it managed to shoot down a non-functioning weather satellite. It has reportedly failed in three previous tests.

<https://zeenews.india.com/world/chinas-laser-weapon-capable-of-destroying-indian-and-us-satellites-say-analysts-2295566.html>

Forbes

Tue, 14 July 2020

China's J-20B Stealth Jet, upgraded with thrust vector controls, reportedly enters mass production

By Sebastien Roblin

The Hong Kong-based *South China Morning Post* reported on Monday that a new model of China's Chengdu J-20 stealth fighter, the J-20B, is entering "mass production" with sophisticated new thrust-vector controls that significantly enhance maneuverability so as to "meet the original criteria."

According to an anonymous source cited by defense journalist Minnie Chan, commencement of production was celebrated in a ceremony on July 8 attended by the vice-chairman of China's Central Military Commission.

The twin-engine J-20A "Mighty Dragon" entered service in 2017, and today remains the only operational stealth jet designed outside the United States. Around 50 are believed to have been built so far.

However, the *Post* reports the J-20B will continue to rely on Saturn AL-31F M2 turbofans imported from Russia rather than higher-thrust domestic WS-15 engines China is still struggling to refine for production.

Tilting Nozzles, Supermaneuverable Jets

Chengdu Aviation Corporation has reportedly set up four production lines each capable of producing one J-20B per month, and the Chinese military is supposedly sufficiently satisfied with the model's refinements to place a large order. However, Chan's article details only one major new technology.

Thrust Vector Control (TVC) allows a pilot to tilt the exhaust nozzles of a jet engine to redirect thrust, allowing aircraft like the F-22 Raptor and Russia Su-35S Flanker to perform jaw-dropping maneuvers at very high angles of attack, meaning the aircraft's nose is pointed at an angle greatly exceeding the plane's current vector.

Such maneuvers may grant a pilot an edge when evading a missile or seeking an advantageous position in within-visual-range air-to-air combat.

However, many cutting-edge jet fighters do not use thrust-vector engines. For one, maneuvers leveraging thrust-vectoring drain an aircraft's energy very rapidly, leaving it in a low-energy state



TOPSHOT - A Chinese J-20 stealth fighter performs at the Airshow China 2018 in Zhuhai in southern China's Guangdong province on November 6, 2018. (Photo by WANG ZHAO / AFP) (Photo by WANG ZHAO/AFP via Getty Images)

vulnerable to follow-on attacks. This was allegedly a downside exploited by U.S. F-15 jets in a Red Flag exercise against thrust-vectoring Indian Air Force Su-30MKI jets in 2008.

Furthermore, U.S. air combat doctrine emphasizes maintaining a high-energy state, and executing stealthily, beyond-visual range missile attacks.

Therefore, Western designers have mostly deemed the added weight and complexity of thrust-vector controls to not be worth the added cost outside of the pricey air-to-air specialized F-22 Raptor, or jump jets like the Harrier or F-35B Lightning, which primarily exploit thrust-vectoring for short or vertical takeoff-and-landing capability.

However, thrust vectoring controls *are* common in modern Russian jet fighters.

Interceptor or Air Superiority Fighter?

If true, the decision to install thrust-vectoring on the J-20B hints at the intended role of the Chinese stealth fighter.

Initially, Western analysis of the J-20 estimated that it was a fast and hard-hitting—but not highly maneuverable—interceptor or strike fighter optimized for hit-and-run attacks rather than an air-superiority fighter designed to engage enemy fighters while performing tight air combat maneuvers.

Chan's article notes Western reports of the J-20A's 'lack of maneuverability'—although whether the PLAAF concurred with that assessment is unclear.

This limited concept of the J-20's intended role and capabilities has received push-back in recent years from some analysts which now seems merited.

In December 2016, China struck a deal to import 24 Su-35S fighters—an order widely speculated to be primarily aimed at procuring the thrust-vector-capable Russian jets for study by Chinese technicians.

Then in 2018, a J-10C fighter outfitted with thrust-vectoring controls was showcased at the Zhuhai airshow, revealing Chinese development of the technology.

The *Post's* report that the J-20B will use thrust-vectoring controls, if accurate, indicates the PLAAF *does* want to enhance the maneuverability of the J-20. That in turns implies intent for the J-20 to perform in a traditional air superiority role of engaging and defeating agile enemy fighters.

To be clear, low-observability on radar and long-range missiles and sensors would likely remain the J-20's primary asset in air-to-air combat. However, an air superiority fighters ideally need to be able to hold its own within visual range, particularly if pitted against advanced fighters capable of eluding long-range sensors and/or missiles.

China's Engine Woes

Unfortunately for the PLAAF, an arguably more important puzzle piece to unlocking the J-20's intended performance remains stubbornly out of reach according to Chan's article: a domestically built WS-15 turbofan engine capable of generating 44,000 pounds of thrust. The AL-31F M2 engine currently in use generate 32,600 pounds of thrust.

Refining the WS-15 will finally make it possible for the J-20 to improve its currently subpar thrust-to-weight ratio. It could also eventually free Chinese manufacturers from their dependence on Russian-built jet engines.

Severe quality-control issues have dogged China's attempts to mass-produce domestic Shenyang WS-10 Taihang turbofans for years, leading to their frequent substitution with Russian engines. The Xian WS-15 Emei turbofan will necessarily need to overcome these problems while pushing the performance envelope further.

Chan's source claims WS-15 development is progressing "quite smoothly" and that it may be ready in "one or two years," at which points the J-20B would be able to swap WS-15s in place of AL-31 engines. However, such estimates have been wrong before, and it is surely disappointing for the PLAAF that the second production model of the J-20 fighter must enter service still using lower thrust stop-gap engines.

To be fair, Russia too is using a stop-gap turbofan engine on its troubled Su-57 stealth jets until a higher thrust model is ready later in the 2020s.

These issues aside, the reports of the J-20B model suggests the continued maturation of the J-20 platform, and add to the evidence that it is intended serve as an air superiority fighter capable of holding its own against agile enemy fighters.

This in turn could imply new challenges to the air superiority doctrine of countries like India, Japan and the United States competing with China in the Indo-Pacific.

<https://www.forbes.com/sites/sebastienroblin/2020/07/13/agile-j-20b-stealth-jets-with-thrust-vector-controls-enter-production-according-to-chinese-media/#d561ba61fbc5>



Tue, 14 July 2020

Beijing calls Japan's F-35 deal with the US a big threat to China, Russia

The US recently approved the sale of F-35 joint strike fighters to Japan at a whopping cost of \$23 billion. China, a traditional foe and close neighbour of Japan has expressed concern of having such advanced jets in the region which could be detrimental to the security of both China and Russia.

Chinese state media – the Global Times acknowledges for once that Japan is buying the US' F-35 jets out of practicality and as Tokyo needs to upgrade its current F-2s and F-15s jets.

GT also accepts that Japan could be facing pressure from China and Russia and Tokyo has rationally opted to go for the most advanced jets in the world – the F-35s to counter the dual challenge of Beijing and Moscow.

It goes on to say – Japan has made substantial improvement in its military modernization program. The first of the Izumo-class helicopter carriers, Izumo, has marked a milestone in its transformation into Japan's first true aircraft carrier since World War II. The other Izumo-class carrier Kaga is also under transmutation. Both ships will be transformed into light aircraft carriers on which approximately 20 F-35s can be stationed.

But light aircraft carriers have restricted combat capabilities. Due to political issues, the reformations are concerning in certain quarters because they represent "the first time" that modern Japan has had fixed-wing aircraft carriers.

Japan is approving a strategy of taking rapid moves in carrier development. Of special interest will be any plan by Japan to develop real carriers over 50,000 tons. If they acquire a large number of F-35Cs, it will imply a new stage of Japanese aircraft carrier development.

Such a massive military advancement in Japan will bother its neighbours i.e. Russia and China. There are apprehensions that Japan will amend its peaceful constitution. This could turn Japan into an aggressive, hostile force and nations that suffered in World War II because of Japanese expansionist policy will be closely watching.

Japan is a key defence partner of the US. It is also part of Washington's so-called global alliance that targets China. Tokyo is also collaborating with the US by developing an anti-missile system, which will affect the strike capabilities of China and Russia and endanger its security, writes the GT.

Without self-sufficient defence capabilities, Japan is incapable of holding by itself and will only end up being commanded by the US. Although Japan has its own strategies and doesn't want to be fully commanded by Washington, the US will unquestionably tighten its grip over Tokyo and use it against China and Russia.

GT accuses the US of hunting in a group, indirectly referring to all the alliances that Washington has all over the globe. Japan has limited military capabilities and is only capable of integrated combat with the assistance of the US, the report says.

<https://www.defencenews.in/article/Beijing-calls-Japan%E2%80%99s-F-35-deal-with-the-US-a-big-threat-to-China,-Russia-871595>

Science & Technology News



Tue, 14 July 2020

Tiny bubbles make a quantum leap

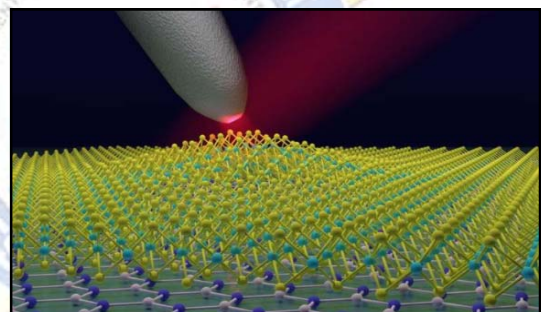
Researchers at Columbia Engineering and Montana State University report today that they have found that placing sufficient strain in a 2-D material—tungsten diselenide (WSe₂)—creates localized states that can yield single-photon emitters. Using sophisticated optical microscopy techniques developed at Columbia over the past three years, the team was able to directly image these states for the first time, revealing that even at room temperature they are highly tunable and act as quantum dots, tightly confined pieces of semiconductors that emit light.

"Our discovery is very exciting, because it means we can now position a single-photon emitter wherever we want, and tune its properties, such as the color of the emitted photon, simply by bending or straining the material at a specific location," says James Schuck, associate professor of mechanical engineering, who co-led the study published today by *Nature Nanotechnology*. "Knowing just where and how to tune the single-photon emitter is essential to creating quantum optical circuitry for use in quantum computers, or even in so-called 'quantum' simulators that mimic physical phenomena far too complex to model with today's computers."

Developing quantum technologies such as quantum computers and quantum sensors is a rapidly developing field of research as researchers figure out how to use the unique properties of quantum physics to create devices that can be much more efficient, faster, and more sensitive than existing technologies. For instance, quantum information—think encrypted messages—would be much more secure.

Light is made up of discrete packets of energy known as photons, and light-based quantum technologies rely on the creation and manipulation of individual photons. "For example, a typical green laser pointer emits over 10¹⁶ (10 quadrillion) photons every second with the mere push of a button," notes Nicholas Borys, assistant professor of physics at Montana State University and co-PI of this new study. "But developing devices that can produce just a single controllable photon with a flip of a switch is extremely difficult."

Researchers have known for five years that single-photon emitters exist in ultrathin 2-D materials. Their discovery was greeted with much excitement because single-photon emitters in 2-D materials can be more easily tuned, and more easily integrated into devices, than most other single-photon emitters. But no one understood the underlying material properties that lead to the



Schematic of a laser-illuminated nano-optical probe investigating a strained nanobubble of tungsten diselenide (WSe₂; green and yellow balls), a 2-dimensional semiconductor. The single layer of WSe₂ is sitting on a layer of boron nitride (blue and grey balls). Credit: Nicholas Borys/Montana State University

single-photon emission in these 2-D materials. "We knew that the single-photon emitters existed, but we didn't know why," says Schuck.

In 2019 a paper came out from the group of Frank Jahnke, a professor at the Institute for Theoretical Physics at the University of Bremen, Germany, that theorized how the strain in a bubble can lead to wrinkles and localized states for single-photon emission. Schuck, who focuses on sensing and engineering phenomena emerging from nanostructures and interfaces, was immediately interested in collaborating with Jahnke. He and Borys wanted to focus in on the tiny, nanoscale wrinkles that form in the shape of doughnuts around bubbles that exist in these ultrathin 2-D layers. The bubbles, typically small pockets of fluid or gas that get trapped between two layers of 2-D materials, create strain in the material and lead to the wrinkling.

Schuck's group, and the field of 2-D materials, faced a major challenge in studying the origins of these single-photon emitters: the nanoscale strained regions, which emit the light of interest, are much smaller—roughly 50,000 times smaller than the thickness of a human hair—than can be resolved with any conventional optical microscope.

"This makes it difficult to understand what specifically in the material results in the single-photon emission: is it just the high strain? Is it from defects hidden within the strained region?" says the study's lead author Tom Darlington, who is a postdoc and former graduate researcher with Schuck. "You need light to observe these states, but their sizes are so small that they can't be studied with standard microscopes."

Working with other labs at the Columbia Nano Institute, the team drew upon their decades-long expertise in nanoscale research. They used sophisticated optical microscopy techniques, including their new microscopy capability, to look not just at the nano-bubbles, but even inside them. Their advanced "nano-optical" microscopy techniques—their "nanoscopes"—enabled them to image these materials with ~10 nm resolution, as compared to approximately 500 nm resolution achievable with a conventional optical microscope.

Many researchers have thought that defects are the source of single-photon emitters in 2-D materials, since they usually are in 3-D materials such as diamond. To rule out the role of defects and show that strain alone could be responsible for single-photon emitters in 2-D materials, Schuck's group studied the ultralow-defect materials developed by Jim Hone's group at Columbia Engineering, part of the NSF-funded Materials Research Science and Engineering Center. They also leveraged new bilayer structures developed within the Programmable Quantum Materials Center (a DOE Energy Frontiers Research Center), which provided well-defined bubbles in a platform that was easily studied with Schuck's optical "nanoscopes."

"Atomic-scale defects are often attributed to localized sources of light emission in these materials," says Jeffrey Neaton, a professor of physics at UC Berkeley and Associate Laboratory Director for Energy Sciences, Lawrence Berkeley National Laboratory, who was not involved in the study. "The emphasis in this work on the fact that strain alone, without the need for atomic-scale defects, potentially impact[s] applications ranging from low-power light-emitting diodes to quantum computers."

Schuck, Borys, and their teams are now exploring just how strain can be used to precisely tailor the specific properties of these single-photon emitters, and to develop paths towards engineering addressable and tunable arrays of these emitters for future quantum technologies.

"Our results mean that fully tunable, room-temperature single-photon emitters are now within our grasp, paving the way for controllable—and practical—quantum photonic devices," Schuck observes. "These devices can be the foundation for quantum technologies that will profoundly change computing, sensing, and information technology as we know it."

More information: Imaging strain-localized excitons in nanoscale bubbles of monolayer WSe₂ at room temperature, *Nature Nanotechnology* (2020). DOI: [10.1038/s41565-020-0730-5](https://doi.org/10.1038/s41565-020-0730-5)

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

<https://phys.org/news/2020-07-tiny-quantum.html>

New technique shows excellent potential for developing advanced photonic devices

Photonics can be defined as the science of exploiting light. It has numerous applications in contemporary electronics, like health-based devices, semiconductors, and information technology

Therefore, scientists across the world have been working to identify innovative methods to drive developments in the area of photonics. However, the difficulty lies in improving the “photon generation” process as required, which is very important for all applications based on photonics.

In a new research published in the *Nano Letters* journal, a research team from Daegu Gyeongbuk Institute of Science and Technology (DGIST), under the guidance of Professor J. D. Lee, designed an innovative mechanism to increase the efficiency of photon conversion in two-dimensional (2D) materials.

The researchers accomplished this feat by analyzing a technique known as “nonlinear second-harmonic generation” (SHG)—a kind of optical process in which interactions occur between a nonlinear material and two photons with the same level of frequency. Following this, a new photon that has double the energy is produced, thereby resulting in frequency doubling.

The efficient generation of photons is a crucial part of developing photonic devices. In our study, we developed an ultrafast process of photon conversion in an atomistic-layer material to innovate photonics-based applications.

Researchers, Daegu Gyeongbuk Institute of Science and Technology

In their analysis, the researchers worked on tungsten diselenide (WSe₂)—a 2D material—because of its fascinating band properties. For example, this material contains numerous “resonant points” that sensitively react to the absorption of light particles known as “photons.”

We focused on this feature of WSe₂ and revealed a new process to convert the ‘color’ in photons through the maximized dual resonant mode.

J. D. Lee, Study Lead Author and Professor, Department of Emerging Materials Science, Daegu Gyeongbuk Institute of Science and Technology

On the basis of SHG, the scientists suggested a new technique known as “dual-resonant optical sum frequency generation” (SFG), in which they chose a couple of resonant points in WSe₂ referred to as A and D excitons, respectively.

With the help of this technique, the researchers observed that when the WSe₂ material is irradiated with a pair of excitation pulses (ω_1 and ω_2)—with one of the two pulses (ω_1) being adjusted to A exciton and their sum frequency ($\omega_1 + \omega_2$) being tuned to the D exciton—the signal is higher by 20 times when compared to the single-resonant mode.

Added to this, the intensity that was created by this technique was seen to be higher by one order of magnitude than SHG under similar conditions. Such findings were subsequently validated through a range of methods, such as optical experiments and density functional theory, added Professor Lee.

Our proposed dual-resonant SFG method provides new scientific insights into not only nonlinear spectroscopic and microscopic methods but also nonlinear optics and technology using two-dimensional semiconductors.

J. D. Lee, Study Lead Author and Professor, Department of Emerging Materials Science, Daegu Gyeongbuk Institute of Science and Technology

Such findings hold excellent prospects for developing next-generation photonic devices.

“Our study can potentially take photonics-based applications to the next level—for example, cheaper diagnostic methods through better optical imaging instruments in the near future,” concludes Professor Lee.

Journal Reference:

Kim, Y., *et al.* (2020) Dual Resonant Sum Frequency Generations from Two-Dimensional Materials. *Nano Letters*. doi.org/10.1021/acs.nanolett.0c01363.
<https://www.azonano.com/news.aspx?newsID=37436>



Tue, 14 July 2020

Merging solar cell and liquid battery produces long-lasting solar storage

Research opens path for new home solar technology

Solar cell researchers at the University of Sydney and University of New South Wales working with chemists at the University of Wisconsin-Madison in the United States have created a highly efficient and long-lasting solar-flow battery, which is a way to generate, store, and redeliver renewable electricity from the sun in one device.

The new device is made of perovskite-silicon tandem solar cells integrated with specially designed chemical battery components. The solar-flow battery achieved a new record efficiency of 20 percent conversion of energy from the sun. This is 40 percent more efficient than the previous record for solar-flow batteries, which were also developed in the University of Wisconsin Jin lab where lead author, PhD student Wenjie Li, is based.

This work is published today in the journal *Nature Materials* and is a collaboration between UW-Madison, Utah State University, King Abdullah University of Science and Technology in Saudi Arabia, the City University of Hong Kong, UNSW and the University of Sydney.

The researchers turned to an increasingly popular material for photovoltaic cells, halide perovskites, and combined them with silicon solar cells to increase their efficiency by capturing more energy from the sun.

Professor Anita Ho-Baillie at the University of Sydney Nano Institute and postdoctoral researcher Dr Jianghui Zheng at UNSW designed and fabricated the perovskite-silicon tandem solar cells so that they can maintain their performance and stability while withstanding the chemicals in a flow battery.

This research could potentially yield a new way to harvest, store and use the sun's energy for solar home systems.

https://www.eurekaalert.org/pub_releases/2020-07/uos-msc071020.php

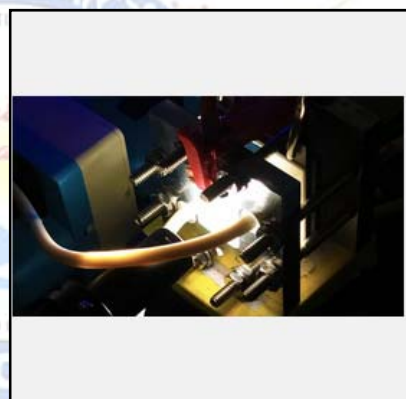


IMAGE: Experimental solar device in the lab at the University of Wisconsin-Madison.

Researcher develops method for mapping brain cell change, development in mice

HERSHEY, Pa. — Penn State researchers have developed a new method for studying key moments in brain development. Yongsoo Kim, assistant professor of neural and behavioral sciences at Penn State College of Medicine, is using the method to understand how oxytocin receptor expression changes in normally developing mice and mouse models of autism spectrum disorder.

The technique allows scientists to create maps of developing mouse brains that can display how much of certain cell types are present in different regions — and it is a critical first step in being able to study neurodevelopmental disorders in the brain.

“Key neural connections form during early development,” said Kim. “We can apply this mapping method to study changes of different brain cell types in developing mouse brains to understand neurodevelopmental disorders at a cellular level.”

Kim and his colleagues created maps to help them understand how oxytocin, a neurotransmitter produced by the brain, is utilized by the brain during the course of early development. Previous research revealed that oxytocin plays a role in regulating social behavior, but there is little information on how the receptors that mediate oxytocin’s effect across the brain’s neural networks are present in different parts of the brain across time during development.

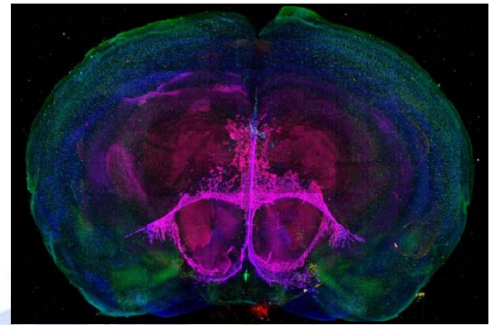
The research team hypothesized that different brain regions would have different expression levels of oxytocin receptor (OTR) as individual brain areas mature. Previous studies investigating oxytocin receptor expression used methods where only select regions of the brain could be analyzed in portions. Kim’s new technique is able to image whole mouse brains at a cellular resolution using serial two-photon tomography and machine learning-based algorithms to detect fluorescently labeled neurons that express oxytocin receptors.

The team created template brains from different early postnatal development periods: 7, 14, 21 and 28 days after birth. The templates were created by generating averages of brain images and labeling key anatomy. They served as a reference point for imaging, detecting, and quantifying the oxytocin receptors during different phases of development.

The results of the study were recently published in *Nature Communications*. Kim and his colleagues found that OTR expression reached its peak in mouse brains 21 days after birth, which is equivalent to early childhood in humans. OTR expression in the hypothalamus continued to increase until adulthood, indicating that oxytocin signaling may play a role in generating sex-specific behavior. The team also studied mice who were unable to produce oxytocin receptors and noted that there was significantly reduced synaptic density — indicating that oxytocin plays a key role in wiring the brain.

Kim said the same method used to study OTR in this study could be applied to other brain cell types in order to understand their spatial arrangement across time. The research team built a web-based platform to host and display the new images for other researchers to access.

“These images will serve as an essential baseline to compare OTR expression in various mouse models of brain disorders,” Kim said. “We were able to study OTR expression in a mouse model of autism and will build on these findings by further studying functional and anatomical changes of



A map of cell types in a developing mouse brain, with colors assigned to structures based on depth within the brain. Image: Kim Lab, Penn State College of Medicine

different brain cell types and how genetic and environmental factors may affect brain development in early childhood.”

Members of the research team include Kyra Newmaster, Zachary Nolan, Uree Chon, Daniel Vanselow and Abigail Weit from the College of Medicine; Manal Tabbaa and Elizabeth Hammock from Florida State University; and Shizu Hidema and Katsuhiko Nishimori of the Fukushima Medical University and Tohoku University Graduate School of Agricultural Science.

This project was supported by funds from the National Institutes of Health, Tobacco CURE Funds from the Pennsylvania Department of Health, the Japan Agency for Medical Research and Development, and JSPS Grant-in-Aid for Scientific Research. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or other funding agencies.

<https://news.psu.edu/story/625557/2020/07/13/research/researcher-develops-method-mapping-brain-cell-change-development>

COVID-19 Research News



Tue, 14 July 2020

Engineered llama antibodies neutralize COVID-19 virus

Antibodies derived from llamas have been shown to neutralise the SARS-CoV-2 virus in lab tests, UK researchers announced today.

The team involves researchers from the Rosalind Franklin Institute, Oxford University, Diamond Light Source and Public Health England. They hope the antibodies - known as nanobodies due to their small size - could eventually be developed as a treatment for patients with severe COVID-19. The peer reviewed findings are published in *Nature Structural & Molecular Biology*.

Llamas, camels and alpacas naturally produce quantities of small antibodies with a simpler structure, that can be turned into nanobodies. The team engineered their new nanobodies using a collection of antibodies taken from llama blood cells. They have shown that the nanobodies bind tightly to the spike protein of the SARS-CoV-2 virus, blocking it from entering human cells and stopping infection.

Using advanced imaging with X-rays and electrons at Diamond Light Source and Oxford University, the team also identified that the nanobodies bind to the spike protein in a new and different way to other antibodies already discovered.

There is currently no cure or vaccine for COVID-19. However, transfusion of critically ill patients with serum from convalesced individuals, which contain human antibodies against the virus, has been shown to greatly improve clinical outcome. This process, known as passive immunisation, has been used for over 100 years, but it is not straightforward to identify the right individuals with the right antibodies and to give such a blood product safely. A lab-based product which can be made on demand would have considerable advantages and could be used earlier in the disease where it is likely to be more effective.

Professor James Naismith, Director of The Rosalind Franklin Institute and Professor of Structural Biology at Oxford University said: "These nanobodies have the potential to be used in a similar way to convalescent serum, effectively stopping progression of the virus in patients who are

ill. We were able to combine one of the nanobodies with a human antibody and show the combination was even more powerful than either alone. Combinations are particularly useful since the virus has to change multiple things at the same time to escape; this is very hard for the virus to do. The nanobodies also have potential as a powerful diagnostic."

Professor Ray Owens from Oxford University, who leads the nanobody program at the Franklin, said: "This research is a great example of team work in science, as we have created, analysed and tested the nanobodies in 12 weeks. This has seen the team carry out experiments in just a few days, that would typically take months to complete. We are hopeful that we can push this breakthrough on into pre-clinical trials."

Professor David Stuart, from Diamond Light Source and Oxford University said: "The electron microscopy structures showed us that the three nanobodies can bind to the virus spike, essentially covering up the portions that the virus uses to enter human cells."

The team started from a lab-based library of llama antibodies. They are now screening antibodies from Fifi, one of the 'Franklin llamas' based at the University of Reading, taken after she was immunised with harmless purified virus proteins.

The team are investigating preliminary results which show that Fifi's immune system has produced different antibodies from those already identified, which will enable cocktails of nanobodies to be tested against the virus.

The Rosalind Franklin Institute is a new research institute funded through UK Research and Innovation's Engineering and Physical Sciences Research Council. The Franklin is leading the UK's work in the innovative field of nanobodies, whose tiny size and specificity make them perfect tools for scientific research, usually used to stabilise proteins for imaging. The Institute is named for the researcher Rosalind Franklin, who was born 100 years ago this year. Although famous for her contribution to the discovery of DNA, Franklin's later career turned to imaging virus structures, including polio.

Professor Naismith said: "2020 marks the centenary of Franklin's birth. As an institute named for a pioneer of biological imaging, we are proud to follow in her footsteps and continue her work in viruses, applied here to an unprecedented global pandemic. Franklin's work transformed biology, and our projects aspire to that same transformational effect."

'Neutralizing nanobodies bind SARS-CoV-2 spike RBD and block interaction with ACE2' by James H Naismith et al. is published in *Nature Structural and Molecular Biology*

<https://doi.org/10.1038/s41594-020-0469-6>

https://www.eurekalert.org/pub_releases/2020-07/trfi-ela071120.php

‘Bats spread coronavirus, but don’t get infected’: Research on bats provides valuable clue to treating COVID-19

Bats which are rumoured to be the cause behind the Covid-19 pandemic have a remarkable ability to ward off the dangers of the virus, says report

While the most powerful nations of the world are on their knees battling Coronavirus, the animal that is allegedly responsible for the dissemination of many such viral outbreaks remains immune to the deadly disease it causes. Bats which are rumoured to be the cause behind the Covid-19 pandemic have a remarkable ability to ward off the dangers of the virus, says report.

A new scientific paper conducted by the University of Rochester has shone some light on the issue. According to the researchers of the study, the single most important reason behind the rock-solid immunity of bats to the deadly viruses is their ability to control the body inflammation. Incidentally, over-inflammation has also been found as one of the main reasons for the high casualties among the Coronavirus patients.

It is the inflammatory response of the body that is killing the patient more than the virus itself, Vera Gorbunova one of the researchers of the paper was quoted as saying by Sciencedaily.com. He further explained that once the human body gets infected with a virus, the body sounds an alarm and develops a fever or inflammation but whenever the body over-reacts to the entry of a foreign virus then the body over-inflamates and causes complications.

But unlike humans, bats maintain a perfect balance between the immuno-response to the virus and at the same time reduce the multiplication of the virus in their bodies. As a result their immuno-response fights against the virus but does not over inflamate the body.

According to the researchers one of the reasons for the perfect immuno-response of the bats is their ability to fly. Being the only mammal which can fly, the bats get used to sudden ups and downs in their body temperature and other sudden metabolism changes. This helps their bodies to mount a resistance against the virus, the research explains.

Another reason for their strong immunity could be traced to their environment. The environment the bats live in is dense, large and susceptible to the growth of the viruses, say researchers. As a result, the bats are constantly exposed to varied kinds of viruses and pathogens and their immunity system is in a never-ending-war with different kinds of viruses and provides very strong immunity, the researcher says.

The researchers hope that their study would help the scientific community analyse the immuno-response of the bats and find ways to develop therapies which could help humans to fight against such diseases in the future.

<https://www.financialexpress.com/lifestyle/science/bats-spread-coronavirus-but-dont-get-infected-research-on-bats-provides-valuable-clue-to-treating-covid-19/2021662/>



A new scientific paper conducted by the University of Rochester has shone some light on the issue

Coronavirus (Covid-19) vaccines latest updates: CanSino Biologics to start Phase III trials; GSK to develop plant-based vaccine

Coronavirus (Covid-19) Vaccine Latest Update: Russia's Sechenov University has claimed that it had successfully completed tests on volunteers of the world's first vaccine against Covid-19

New Delhi: Coronavirus (Covid-19) Vaccine Latest Update: While reports that Moscow's Sechenov University had finished clinical trials of its experimental vaccine hit headlines on Sunday, the jab is still far away from being ready for mass production and use. The reports did not specifically mention that it was just the phase one trials that had been completed.

TRACKING COVID-19 VACCINES			
CANDIDATE	SPONSOR	TRIAL PHASES	INSTITUTION
AZD1222	The University of Oxford	Phase 3	The University of Oxford, the Jenner Institute
MRNA-1273	Moderna	Phase 2	Kaiser Permanente Washington Health Research Institute
BNT162	Pfizer, BioNTech	Phase 1/2	Multiple study sites in Europe
INACTIVATED VACCINE	Wuhan Institute of Biological Products; China National Pharmaceutical Group (Sinopharm)	Phase 1/2	Henan Provincial Center for Disease Control and Prevention
BBIBP-CORV	Beijing Institute of Biological Products; China National Pharmaceutical Group (Sinopharm)	Phase 1/2	Henan Provincial Center for Disease Control and Prevention
AD5-NCOV	CanSino Biologics	Phase 2	Tongji Hospital; Wuhan, China

Of the 21 vaccine candidates listed by the WHO in clinical trial stages, the vaccine candidates by Chinese company Sinovac, China National Pharmaceutical Group (Sinopharm) and Oxford University-AstraZeneca are undergoing Phase III tests.

In another interesting development, GlaxoSmithKline (GSK), which is already working with Sanofi on a shot, has partnered with Canadian biopharmaceutical firm Medicago to develop and manufacture a plant-based adjuvanted Covid-19 vaccine candidate.

INO-4800	Inovio Pharmaceuticals	Phase 2	Center for Pharmaceutical Research, Kansas City, Mo.; University of Pennsylvania, Philadelphia
CORONAVAC	Sinovac	Phase 1/2	Sinovac Research and Development Co., Ltd.
NVX-COV2373	Novavax	Pre-clinical	Novavax
MRNA-BASED VACCINE	CureVac	Phase 1	CureVac
SELF-AMPLIFYING RNA VACCINE	Imperial College London	Phase 1	Imperial College London
AD26.COV2-S	Johnson & Johnson	Pre-clinical	Johnson & Johnson
COVAXIN	Bharat Biotech	Phase 1	Bharat Biotech and Indian Council of Medical Research

[Coronavirus \(Covid-19\) vaccine latest news, status check](#)

Despite running late on starting Phase III trials, Moderna Inc has signed an agreement with Spain's Laboratorios Farmaceuticos Rovi SA to scale up the manufacturing and production of its potential vaccine to supply markets outside the United States.

CanSino Biologics coronavirus vaccine status

After Sinovac and China National Pharmaceutical Group (Sinopharm), Chinese vaccine developer CanSino Biologics is set to start phase III trials of its vaccine candidate soon, Reuters reported.

CanSino Biologics is in talks with Russia, Brazil, Chile and Saudi Arabia to launch the trials as dipping Covid-19 infections in China has made it harder to conduct large-scale tests.

Qiu Dongxu, executive director and co-founder of CanSino, said the company would recruit 40,000 participants for the test. Its Covid-19 candidate, Ad5-nCov, became the first in China to move into human testing in March.

Qiu said the Phase II trials, involving 508 people, yielded "much better" results than Phase I in respect to safety and ability to trigger immune response. He said a new factory under construction in China would allow it to produce 100-200 million doses of coronavirus vaccines per year by early 2021.

China's military, whose research unit jointly developed the vaccine candidate, approved its military use last month.

Russia coronavirus vaccine status

On Sunday, Moscow's Sechenov University claimed that it had "successfully completed tests on volunteers of the world's first vaccine against Covid-19", sending ripples across the scientific fraternity. The development was also tweeted by the Russian embassy in India.

However, a closer look at the time-frame of the research suggests that it has only cleared Phase 1 of human trials. The vaccine candidate, being developed by the Gamalei National Research

Centre for Epidemiology and Microbiology, in partnership with the Russian Defence Ministry, had begun phase I human trials on June 18 on 18 volunteers from the armed forces.

A report by the TASS news agency of Russia on July 10 said the phase I clinical trials would end on July 15, while the second phase would begin on July 13.

The news report said the ministry had claimed that none of the volunteers had reported any complaints, experienced no side-effects, and would be discharged from the hospital soon.

“Sechenov University has successfully completed tests on volunteers of the world’s first vaccine against #COVID19. The #vaccine is safe. The volunteers will be discharged on July 15 and July 20, chief researcher Elena Smolyarchuk told TASS,” the embassy tweeted.

GlaxoSmithKline coronavirus vaccine status

GlaxoSmithKline (GSK) is set to develop a plant-based adjuvanted Covid-19 vaccine candidate in partnership with Canadian biopharmaceutical firm Medicago.

According to reports, GSK’s adjuvant system will be combined with Medicago’s recombinant Coronavirus Virus-Like Particles (CoVLP), which mimic SARS-CoV-2, and enable identification by the immune system.

In preclinical studies, Medicago’s CoVLP vaccine candidate has shown a high level of neutralising antibodies when a single dose was given with adjuvant.

The company intends to begin Phase I testing this month where the candidate will be given on a one and two-dose vaccination schedule, 21 days apart. GSK and Medicago expect to complete development and make the vaccine available in the first half of next year.

Chongqing Zhifei coronavirus vaccine status

Less than three weeks after it launched clinical trials, China’s Chongqing Zhifei Biological Products has moved into Phase II human tests, the company has said. The vaccine is being co-developed by Anhui Zhifei Longcom Biopharmaceutical and the Institute of Microbiology of the Chinese Academy of Sciences.

The vaccine candidate is one of eight treatments Chinese researchers and companies are testing in humans.

<https://indianexpress.com/article/coronavirus/coronavirus-covid-19-vaccines-latest-news-russia-cansino-biologics-covaxin-gsk-6503814/>

 **The Indian EXPRESS**

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Tue, 14 July 2020

Explained: Why Russian Covid-19 vaccine is far from ready

A report by the TASS news agency of Russia on July 10 said the phase I clinical trials would end on July 15, while the second phase would begin on July 13

By Amitabh Sinha

Like all the other potential candidates, one being developed in Russia is also far from being ready at this point. Numerous reports on Sunday had claimed that clinical trials for a Russian vaccine had been ‘successfully’ completed. What these reports did not specifically mention is that only phase-I of the clinical trials had been completed. Phase-II trials are supposed to start today, while there is no clarity over phase-III trials.

There is only one candidate vaccine being developed in Russia which has reached the human clinical trial stage. That candidate, being developed by the Gamalei National Research Centre for Epidemiology and Microbiology, in partnership with the Russian Defence Ministry, had begun phase-I human trials on June 18, with 18 volunteers from the armed forces having been chosen for administering the vaccine.

A report by the TASS news agency of Russia on July 10 said the phase-I clinical trials will end on July 15, while the phase-II will begin today, that is July 13.

“...An in-ward treatment of the first group of volunteers, who were tested for the safety and tolerability of the vaccine, will end on July 15,” the TASS agency quoted Russian Defence Ministry as saying.

‘Safety and tolerability’ of a vaccine is tested in phase I on a small group of volunteers. The news report said the ministry had claimed that none of the volunteers had reported any complaints, there experienced no side-effects, and would be discharged from the hospital soon.

“On Monday, July 13, the second group of volunteers, who are tested for the efficiency and immunogenicity of the vaccine, will be injected with the second component of the vaccine against the Coronavirus,” the agency further said. This round would involve the injection of the vaccine amongst civilian volunteers as well.

‘Efficiency and immunogenicity (generation of immune response)’ is tested in phase two of trials. It is in this stage that researchers try to see whether the vaccine is triggering the desired immune response in human beings, and what could be the suitable doses to generate this response.

Vaccine development usually involve a third phase as well. In fact, no vaccine for largescale use has been approved without the third phase of trials till now. Large number of volunteers, usually numbering several thousands, are enrolled for the third phase in which researchers try to ascertain whether the immune response triggered by the vaccine is able to fight the virus in real life situations. This process could take several months.

In the case of Russian candidate vaccine, as with any other candidate, the success of phase-II trials, which could take at least couple of months, is not guaranteed. The success can only be ascertained after the completion of the trials.

It is not clear as of now whether the Russian candidate vaccine would go through phase-III trials as well. Usually, that is the case, but recently, considering the current emergency situation, a candidate vaccine developed in China has been approved for use after phase-II trials itself, but it is supposed to be administered only on army personnel as of now. It will depend on the Russian regulatory authorities to decide whether the Russian vaccine would need phase III trials as well.

There are over 150 candidate vaccines for Coronavirus being developed all over the world. Nearly half of these are still in pre-clinical stages, meaning they are being tried on animals or are still in early stages of development. About 15 vaccines are in phase-I trials and about ten in phase-II trials. Three vaccines are in phase-III trials.

Even after the successful completion of phase-III, it usually takes several months before a vaccine is accessible to a general public. Several rounds of regulatory and administrative approvals are required. That is why several scientists, and even WHO officials, have been maintaining that it would be take at least 12-18 months before any Coronavirus vaccine is able to hit the market.

Even then, the vaccine is unlikely to be available for all at one go. Initially, it is expected to be made available only to people who are at higher risk of getting the infection, like healthcare workers. A universal immunisation against Coronavirus can take several years, just like it has been the case with other vaccines.

<https://indianexpress.com/article/explained/why-russian-coronavirus-covid-19-vaccine-is-far-from-ready-6503583/>

Coronavirus vaccine: Covid immunity may not last for too long, says new UK study

Covid immunity may not last for too long, says new UK study

Even as COVID-19 cases rise every day, researchers continue to work 24x7 to develop a vaccine to fight the pandemic. Most recently, Russian scientists made headlines when they announced the completion of successful clinical trials of their homegrown vaccine. At least 5 other candidates are in advanced stages of vaccine development, with hopes of the public getting a vaccine before the year end, raising hopes that immunity against the deadly infection might be possible in the near future. However, our dream might just be shortlived as per a new study.

A study done out of a leading academic institution based out of London had made a startling revelation, finding that immunity driven by vaccines may just exist temporarily.

The study

For the same, scientists based out of King's College London found out that people who have recovered from COVID-19 may begin to lose out on antibodies (i.e., the good cells garnering them protection) just three months after the infection. If this holds true, it might hold a clue to the fact that immunity against coronavirus may just be shortlived and most importantly, SARS-COV2 may just continue to affect population season after season, just like the common cold.

The claim of antibodies beginning to wane away may also brings to light the real purpose of a vaccine.

Vaccine may not provide immunity, study finds

For the study, scientists analyzed samples of 90 healthcare workers. It was observed that the level of antibodies in the patients peaked three weeks post-infection and slowly began to vanish.

According to the survey, while 60% of patients showed good antibody response during peak infection, only 17% amongst them continued to have the same antibody levels three months later.

It was also observed that depending on the person's health, antibodies may fall as much as 23 folds and almost become undetectable.

The sample study was done to observe the possibility of herd immunity driven by a vaccine push for the community. Lead author, Dr Katie Doores said:

“People are producing a reasonable antibody response to the virus, but it’s waning over a short period of time and depending on how high your peak is, that determines how long the antibodies are staying around,”

How do antibodies protect us from infections?

Antibodies act as our body's first line of defence against infection. Going by the study, if antibodies continue to wane and do not protect the body against reinfection, it might suggest the fact that COVID-19 could keep reinfecting people in waves and no vaccine could really provide long-term immunity against the infection.

A similar study on COVID-19's reinfection wave was done by another group of scientists from the UK, some months back which suggested that the coronavirus could keep surfacing after season, just like a cold or the flu, and never really go away.

Can a stronger vaccine dose fight the virus?

The study follows observations from Oxford University-AstraZeneca's vaccine trials, which suggested that the vaccine may be able to guarantee immunity for at least a year's time.

Dr Doores also suggested that the world might need a stronger vaccine to fight any mutations, reinfections, adding that a single shot might not be sufficient:

“People may need boosting and one-shot might not be sufficient...Infection tends to give you the best-case scenario for antibody response, so if your infection is giving you antibody levels that wane in two to three months, the vaccine will potentially do the same thing,”

<https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/coronavirus-vaccine-covid-immunity-may-not-last-for-too-long-says-new-uk-study/photostory/76942925.cms?picid=76942942>

Outlook
THE NEWS SCROLL

Tue, 14 July 2020

KPIT Technologies innovates versatile ventilators in fight against COVID-19

Eds: Disclaimer: The following press release comes to you under an arrangement with Business Wire India. PTI takes no editorial responsibility for the same.) Pune, Maharashtra, India – Business Wire India

- Ventilators are a result of KPIT’s passion for engineering and commitment towards community contribution
- Innovation awarded by Marico Foundation as the top winner in their Innovate2BeatCOVID national challenge KPIT Technologies, a global technology company, announced its contribution towards community through an innovation of portable, versatile ventilators to equip the medical fraternity with affordable medical devices for the treatment of COVID-19.

The ventilators are designed to serve the entire need of support spectrum from ambulances to ICUs (intensive care units) as well as at-home-care; and are compatible with both AMBU (Artificial Manual Breathing Unit) bags and compressors. The fully equipped ventilators are a testimony to KPIT’s years of specialization in product engineering and embedded software. Adding to KPIT’s expertise is a collaborative team of best-in-field partners ecosystem that include experts in equipment manufacturing - Accurate Industrial controls Pvt. Ltd.; ergonomic design of medical equipment - Design Directions, along with the support of Department of Technology, University of Pune. KPIT’s experience in embedded software, gained over decades, further supported the use of unique processes to excel in measurements and accuracy of the solution. These ventilators have been certified by NABL (National Accreditation Board for Testing and Calibration Laboratories) accredited laboratories and validated as versatile, safe and robust by doctors. This Innovation was awarded by Marico Foundation as one of the top winners in Innovate2BeatCOVID national challenge in the ventilator category that received more than 600 entries. The award is a testimony to KPIT’s capability and efforts of continued contributions through uncompromised, top-notch solutions in creation of a cleaner, smarter and safer world. Ravi Pandit, Co-founder and Chairman, KPIT Technologies Ltd., said, "Our entrepreneurial team took the COVID-19 challenge as an opportunity to build a technology that saves lives. We have developed a solution that competes with the best currently available ventilators in features and functionality while providing exceptional affordability. KPIT has partnered with the most competent organizations to ensure that the solution is not only engineered well but is also designed and manufactured with the same care and diligence. Our solution was designed by benchmarking against the recommended features and specifications by organizations such as WHO (World Health Organization), Health Ministry of India, DRDO (Defence Research and Development Organization), MIT (Massachusetts Institute of Technology) Boston and University of Florida.” For more information about these ventilators and enquiries: <https://kpit.com/kpit-versatile-ventilators-covid19-innovation/> About KPIT KPIT is a global technology company with software solutions that will help mobility leapfrog towards an autonomous, clean, smart and connected future. With 7000+ automobelievers across the globe, specialising in embedded software, AI & digital solutions, KPIT enables customers to accelerate the implementation of next-generation

mobility technologies. KPIT has development centres in Europe, USA, Japan, China, Thailand and India and works with leaders in mobility and where the ecosystem is transforming.

<https://www.outlookindia.com/newscroll/kpit-technologies-innovates-versatile-ventilators-in-fight-against-covid19/1894247>



Tue, 14 July 2020

Coronavirus vaccine: Human trials of India's first coronavirus vaccine to begin, AIIMS Patna selects 18 volunteers for clinical trials

Coronavirus vaccine: Human trials of India's first coronavirus vaccine to begin, AIIMS Patna selects 18 volunteers for clinical trials

It has been more than six months since the outbreak of the novel coronavirus emerged in Wuhan, China and the contagion has infected more than 12 million people across the world and claimed 5,71,660 lives. As of now, there are close to 155 vaccines in several stages of trials to combat the spread of the contagious virus and 22 of them have reached the clinical trial stage.

While we all know about the global frontrunners in the race develop the vaccine including Moderna, CanSino, Inovio, BioNtech, Pfizer and AstraZeneca, back home AIIMS (All India Institute of Medical Sciences) Patna, is all set to begin human trials of India's first coronavirus vaccine, Covaxine.

What is Covaxine

For the unversed, India's first possible COVID vaccine 'Covaxine' will be developed by Bharat Biotech in collaboration with the National Institute of Virology (NIV). To develop the vaccine candidate, the SARSCoV2 strain was isolated in NIV, Pune and transferred to Bharat Biotech. It is an inactivated vaccine which uses the dead SARSCoV2 particles to trigger the body to develop immunity against the virus by creating protective antibodies. According to Bharat Biotech, the vaccine candidate was able to develop an immune response during the pre-clinical trials.

AIIMS Patna to start human trials of Covaxine

To conduct the human trials, ICMR (The Indian Council of Medical Research) had selected 12 medical institutes across the nation including AIIMS Patna and Delhi. The medical institute in Patna will start the clinical trials on 18 volunteers who are between the age of 18 to 55. It should be noted that even though a lot of people contacted the medical institute to take part in the trials, only 18 were selected.

The first phase of trial

All the 18 selected volunteers will undergo a complete medical check-up and the trial will only begin after their reports are carefully analyzed and given a go-ahead. According to the guidelines of The Indian Council of Medical Research, the first dose of Covaxine will be given only to those volunteers whose reports turn out to be okay.

The takeaway

To conduct the first phase of the trial, the participants will be under observation for two to three hours after being administered the first dose. They will be given three doses of the vaccine candidate to complete the trial. To ensure the safety and efficacy of the vaccine, all the volunteers will remain under observation for two to three hours, after each dosage.

<https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/coronavirus-vaccine-update-russias-sechenov-university-claims-to-be-the-first-to-complete-human-trials-heres-what-we-know-so-far/photostory/76935427.cms>

