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

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Israeli team lands in India to develop coronavirus testing kit; French ventilators to arrive today

Apart from mechanical ventilators, that were brought by special permission from Israel for India, the Israeli team has also brought along hi-tech artificial intelligence respirators that will be given as grant to AIIMS, Delhi

By Milan Sharma

New Delhi: India and Israel have kickstarted an anti-coronavirus cooperative operation led by Israel's Ministry of Foreign Affairs and India's Ministry of Defence and the Ministry of Health. A special flight from Tel Aviv landed in New Delhi, carrying a high-level Israeli delegation which has been working with India's chief scientist and Defence Research and Development Organisation (DRDO) to develop rapid testing kits for coronavirus which can give the result within seconds.

Dozens of sophisticated ventilators also arrived on board the special flight. Apart from mechanical ventilators, that were brought by special permission from Israel for India, the Israeli team has also brought along hi-tech artificial intelligence respirators that will be given as grant to AIIMS, Delhi.

The unique cooperation between Israel and India will enable the Israeli delegation to collect tens of thousands of samples in only 10 days, and to analyse them using computer systems based on artificial intelligence, a statement issued by Israel's defence and foreign affairs ministries said.

Israel's Ambassador to India Ron Malka said if the testing kit is developed, it could be a "game-changer" in the battle against coronavirus.

The Israeli defence ministry research and development team has been working with India's chief scientist K Vijay Raghavan and DRDO to develop rapid testing for coronavirus in less than 30 seconds, the Israeli Embassy had said last week.

Since the outbreak of the coronavirus pandemic, Israeli Prime Minister Benjamin Netanyahu and Prime Minister Narendra Modi have held three telephonic conversations in which they promised mutual assistance in dealing with the virus and committed to joint technological and scientific research between the two countries.

FRENCH VENTILATORS, KITS ALSO TO ARRIVE TODAY

A French Air Force aircraft will bring ventilators, test kits and other medical equipment to India on Tuesday as part of coronavirus assistance by France, its embassy said.

President Emmanuel Macron had recently announced the donation of medical equipment to India, as well as the provision of technical expertise, according to a statement by the French embassy.



Equipment and devices including Israeli techs to combat Covid-19 in India arrived on Monday (Image tweeted by Ron Malka, Ambassador of Israel to India)

As part of this medical assistance package, France is donating 50 Osiris-3 ventilators and 70 Yuwell 830 ventilators with BiPAP mode, it said.

Osiris ventilators are particularly useful for emergency transport, intra-hospital transfer and recovery. They have different ventilation modes, including non-invasive ventilation, it said.

The Yuwell 830 ventilators have bi-level positive airway pressure (BiPAP) -- a non-invasive technique to supply oxygen to the lungs without intubation. These high-quality ventilators meet the needs of Indian hospitals, the embassy said.

INDIA TO RAMP-UP TESTING TO 10 LAKH A DAY

Meanwhile, India has also stepped-up its testing capacity aiming for 10 lakh tests - PM Narendra Modi virtually launched three new coronavirus testing labs in Maharashtra and West Bengal along with Uttar Pradesh. The labs will have a combined testing capacity of 10,000 samples a day -- with the Noida facility being the largest.

<https://www.indiatoday.in/india/story/israeli-team-lands-in-india-to-develop-coronavirus-testing-kit-french-ventilators-to-arrive-today-1705201-2020-07-28>

THE TIMES OF INDIA

Wed, 29 July 2020

France donates ventilators to India as Covid-19 assistance

By Indrani Bagchi

New Delhi: France donated 50 Osiris-3 ventilators and 70 Yuwell 830 ventilators with BiPAP mode to India, as coronavirus infections in India continue to surge. The French donation was announced even as Israel brought in 50 mechanical ventilators as well as starting a new initiative to work together to build Covid testing systems.

In a letter to Prime Minister Narendra Modi last week, Emmanuel Macron, French President announced the donation of medical equipment from France to India as well as technical expertise.

“When France was going through a critical phase of this public health crisis earlier this spring, India was by our side. It played a very important role with regard to medicines.”

A statement from the French embassy said, “Osiris ventilators are particularly useful for emergency transport, intra-hospital transfer and recovery; they have different ventilation modes, including non-invasive ventilation. The Yuwell 830 ventilators have bilevel positive airway pressure (BiPAP) – a non-invasive technique to supply oxygen to the lungs without intubation. These high-quality ventilators meet the needs of Indian hospitals.”

In a statement, the Israel embassy said, “In the early hours of this morning, a special flight from Tel Aviv landed in New Delhi carrying a high ranking MOD R&D team which has been working with India’s Chief Scientist and DRDO to develop rapid testing for Covid-19 in under 30 seconds.” This is part of an unprecedented anti-Covid-19 cooperative operation between India and Israel, spearheaded by Israel’s Ministry of Foreign Affairs (MFA), India’s Ministry of Defence (MOD) and the Ministry of Health. The embassy said that by merging Israeli technology with Indian development and production capabilities, the two countries aim to allow a swift resumption of normal life alongside the virus.

Ron Malka, Israeli ambassador said on Twitter, “I am very happy to return to India at the head of this important MOD delegation which is here to work with India on rapid Covid-19 testing, and on a plane loaded with advanced Israeli technologies for Covid-19 relief chosen by the MFA, MOD and Ministry of Health, and ventilators for Covid-19 treatment granted with special



authorization by the Israel government. India and Israel are working together to find solutions for this global pandemic and will share our successful outcomes with the world.”

France will also donate 50,000 high-quality serological IgG/IgM test kits and 50,000 nose and throat swabs and modes of medical transport. “An expert mission on inter-hospital transfers by military means is also being dispatched. France acquired expertise in this matter during the crisis as it had to organize many transfers between hospitals.” The embassy spokesperson said.

<https://timesofindia.indiatimes.com/india/france-donates-ventilators-to-india-as-covid-19-assistance/articleshow/77211345.cms>

DRDO Technology News

live**mint**

Wed, 29 July 2020

DRDO's 'Dare to Dream 2.0' challenge: 5 things to know

- *DRDO's 'Dare to Dream 2.0' challenge is a scheme to promote the Indian innovators and startups for innovations in defence and aerospace technologies*
- *Defence Minister Rajnath Singh announced DRDO's 'Dare to Dream 2.0' contest on Monday*

Defence Research and Development Organisation (DRDO) has launched its innovation contest 'Dare to Dream 2.0' on the 5th death anniversary of former President and noted scientist Dr APJ Abdul Kalam. On Monday Defence Minister Rajnath Singh announced DRDO's 'Dare to Dream 2.0' contest, a scheme to promote the Indian innovators and startups for innovations in defence and aerospace technologies.

Here is all you need to know about DRDO's 'Dare to Dream 2.0' contest:

1. The 'Dare to Dream 2.0' is an open challenge to promote the innovators and startups of the country.
2. The scheme is being launched for emerging technologies to promote the individuals & startups for innovation in defence and aerospace technologies in the country after the call of 'Atmanirbhar Bharat' given by Prime Minister Shri Narendra Modi.
3. The winners will be decided after due evaluation by an expert committee.
4. Award money, up to ₹10 lakh for startup and ₹five lakh to individual category, will be given to the winners.
5. Further information will be available on DRDO website soon.



Defence Minister Rajnath Singh. (ANI)

<https://www.livemint.com/news/india/drdo-s-dare-to-dream-2-0-challenge-5-things-to-know-11595902496789.html>

तकनीक से जुड़ी खबर: डीआरडीओ व इसरो को मिलेगी इससे मदद; रक्षा, अंतरिक्ष में तकनीक सुझाएंगे आईआईटी छात्र

आईआईटी इंदौर में सेंटर फॉर फ्यूचरिस्टिक डिफेंस एंड स्पेस टेक्नोलॉजी (सीएफडीएसटी) बनने जा रहा है। डीआरडीओ और इसरो सहित डिफेंस और स्पेस के लिए काम करने वाली सरकारी संस्थाओं के साथ कोलाबोरेशन के बाद आईआईटी का यह सेंटर उन्हें तकनीकी मदद उपलब्ध करवाएगा।

खास बात यह होगी कि वर्तमान में उपयोग की जा रही तकनीकों के साथ ही भविष्य में क्या तकनीक उपयोग की जा सकेंगी, इसके लिए भी यह सेंटर काम करेगा। दोनों ही क्षेत्रों के स्टार्टअप इकोसिस्टम को तैयार करने में भी सेंटर मदद करेगा। सेंटर के जरिए संस्थान दो महत्वपूर्ण क्षेत्रों में अपनी मौजूदगी दर्ज करवाएगा ही, इसके अलावा डीआरडीओ और इसरो जैसी संस्थाओं में रिसर्च के नए आयाम भी आईआईटी के छात्रों को पता लगेंगे। आईआईटी से मिली जानकारी के अनुसार सेंटर तैयार करने के पीछे एक मुख्य उद्देश्य छात्रों और फैकल्टी मेंबर्स में डिफेंस और स्पेस में अपने योगदान देने की जागरूकता लाना भी है।



<https://www.bhaskar.com/local/mp/indore/news/drdo-and-isro-will-get-help-from-this-iit-students-will-suggest-technology-in-defense-space-127562720.html>

ज्ञान प्रसार एवम् विस्तार
के 50 वर्ष

Govt unveils amended draft acquisition procedure for defence products

New Delhi: The government issued an amended draft Defence Acquisition Procedure (DAP) on Tuesday, wherein it elaborated on how to use "leasing" method to get various defence products and on procedure to procure information and communication technology (ICT) systems for the armed forces.

The first draft of the DAP, which was then called Defence Procurement Procedure, was issued on March 20 this year. In a statement, the Defence Ministry said on Tuesday it received suggestions from various stakeholders running into more than 10,000 pages on the first draft.

Therefore, after analysing those suggestions and holding meetings with stakeholders, the ministry said, the amended DAP was issued.

The ministry said there are four new chapters in the amended DAP -- leasing; simplified capital expenditure procedure; acquisition of systems products and ICT systems; procurement from DRDO (Defence Research and Development Organisation), DPSUs (Defence Public Sector Units) and OFB (Ordnance Factory Board).

"The amended second draft (known as DAP) has since been finalised by the review committee driven by tenets of defence reforms announced as part of the "Atmanirbhar Bharat Abhiyan" and has been placed in the public domain," the ministry said.

The stakeholders can send their comments on the amended draft by August 10, 2020.

In March this year, the first draft of the DAP had introduced "leasing" as one of the categories to get defence equipment at affordable rates. The second draft has a whole chapter on it explaining the terms, conditions and procedure for procurement under the "leasing" method.

The DAP is issued to ensure timely procurement of best military equipment and platforms for the armed forces through optimum utilisation of budgetary resources.

Moreover, the DAP's focus is also on promoting self-reliance in defence equipment production, with an ultimate aim to develop India as a global defence manufacturing hub.

The DAP remains in place for a period of five years. The last DAP was issued in 2016.

According to the Department of Defence Production, India aims to export defence products worth Rs 15,000 crore in 2020-21. Between April 1 and July 23, India has been able to export defence equipment and platforms worth Rs 1,892 crore, it said on its website.

In 2019-20 and 2018-19, India's defence exports stood at Rs 9,115 crore and Rs 8,320 crore, respectively, the department noted.

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

<https://www.outlookindia.com/newscroll/govt-unveils-amended-draft-acquisition-procedure-for-defence-products/1904711>

IAF Chief Bhadauria to receive first squadron of 5 Rafale Jets today, security tightened around Ambala airbase

Moreover, section 144, which prohibits assembly of four or more people, has been imposed in the villages adjoining the airbase, including Dhulkot, Baldev Nagar, Garnala and Panjkhora

By Manmath Nayak

New Delhi: Expected to boost the combat capabilities of the Indian Air Force, the first squadron of five Rafale jets will arrive in India's Ambala airbase today. IAF chief RKS Bhadauria will receive the Rafale jets at the Ambala airbase.

Ahead of its arrival, authorities have tightened security and imposed prohibitory orders near the Ambala Air Force Station in Haryana. For security purpose, authorities have also banned shooting of videos and photography.



Part of security measure, the Ambala district administration has prohibited people from flying private drones within the three-km radius of the airbase.

Moreover, section 144, which prohibits assembly of four or more people, has been imposed in the villages adjoining the airbase, including Dhulkot, Baldev Nagar, Garnala and Panjkhora.

These fighter jets took off from France on Monday and covered a distance of 7,000 km with air-to-air refuelling and a single stop in the United Arab Emirates.

As per updates, the first squadron of the Rafale jets will be stationed at the Ambala airbase. These jets later in the day will be inducted into the IAF through a formal induction ceremony.

The IAF has undertaken major infrastructure upgrades at the Ambala base for the deployment of the first Rafale squadron. Built in 1948, the airbase is located on the east side of Ambala in Haryana and is used for military and government flights.

The development comes as India had inked a Rs 59,000-crore deal on September 23, 2016 to procure 36 Rafale jets from French aerospace major Dassault Aviation.

The fleet comprises three single seater- and two twin seater- aircraft. They will be inducted into the Indian Air Force as part of its No 17 Squadron, also known as the Golden Arrows at Ambala airbase. Meanwhile, the IAF said that the pilots, ground crew and the fighter will be operationally ready as the jets reach India.

It is believed that the Rafale jets would be a game changer in the current scenario when India is engaged in a bitter standoff with China in Eastern Ladakh.

The first Rafale fighter was handed over to the Indian Air Force (IAF) in October 2019 in a ceremony attended by the French Minister for Armed Forces Madame Florence Parly and Indian Defence Minister Rajnath Singh.

The delivery of 10 aircraft has been completed on schedule. Five will stay back in France for training mission. The delivery of all 36 aircraft will be completed on schedule by the end of 2021.

Besides the missile systems, the Rafale jets will come with various India-specific modifications, including Israeli helmet-mounted displays, radar warning receivers, low-band jammers, 10-hour flight data recording, infra-red search and tracking systems, among others. (With inputs from PTI, IANS)

<https://www.india.com/news/india/iaf-chief-bhadauria-to-receive-first-squadron-of-5-rafale-jets-today-security-tightened-around-ambala-airbase-4096759/>

IAF Rafale fighters arrive at Ambala air base today, set to change war dynamics

The Rafale aircraft are expected to significantly boost the Indian Air Force's combat capabilities
Edited By Arun Kumar Chaubey

Highlights

- 1. Rafale fighter aircraft can go up to 3700 kilometers at a time, but with the aerial refueling in war-like situations, it can remain in the air for a longer period to foil the designs of enemies**
- 2. Rafale aircraft has a camera weighing about a thousand kilograms which is capable of taking pictures of a cricket ball lying on the ground from a height of thousands of feet**
- 3. With multi-directional Radar, Rafale can simultaneously target more than 40 targets in the 100 km range. It also has the capability to fire 2500 shells within a minute**

New Delhi: The batch of the first five Rafale combat aircraft arriving at Ambala airbase on Wednesday (July 29) will put an end to Indian Air Force's 18-year-long wait. Air Force chief Air Chief Marshal RKS Bhadauria would be visiting Ambala to receive the Rafale which is being inducted as part of India's biggest defence deal.

Since these fighter jets will give new strength to the country's security, the DNA analysis will talk about the key features of these combat aircraft which are India's first major acquisition in over two decades. The Rafale aircraft are expected to significantly boost the Indian Air Force's combat capabilities.

The Rafale aircraft is capable of receiving mid-air refueling at an altitude of about 30 thousand feet. The five jets that took off from the Merignac airbase in French port city of Bordeaux on Monday, will be covering a distance of nearly 7,000 km to arrive in Ambala on Wednesday afternoon. The fighter jets were refueled more than once in their journey.

In the mid-air refueling process, the jets were fueled by French Air Force aircraft while flying at a speed of about 500 kilometers per hour. The aerial refueling capability has strategic importance as it increases the flight capability of any aircraft.

Rafale fighter aircraft can go up to 3700 kilometers at a time, but with the aerial refueling in war-like situations, it can remain in the air for a longer period to foil the designs of enemies. It can fly continuously for 10 hours but has to be refueled for 6 times.

Other features of the Rafale fighter aircraft may surprise you. For example, it has a camera weighing about a thousand kilograms which is capable of taking pictures of a cricket ball lying on the ground from a height of thousands of feet.

It is also capable of attacking an enemy from a height of 55000 feet, besides carrying 16 tons of bombs and missiles at a time. Rafale is the only fighter aircraft in the world that can carry a payload of one and a half times its weight.

With multi-directional Radar, Rafale can simultaneously target more than 40 targets in the 100 km range. It also has the capability to fire 2500 shells within a minute.

The Rafale jet, capable of launching a nuclear attack, can fly at a speed of about 2130 kilometers per hour, i.e. the speed of this aircraft is twice the speed of sound.

The Rafale is equipped with 6 laser-guided bombs along with three types of deadly missiles. In these laser-guided bombs, each bomb costs up to Rs 3 crore. These bombs were used to destroy the ISIS bases in Syria and Iraq.



The Rafale also boasts of an Integrated Self-Protection System, termed as Spectra, which acts as a defence shield. This can jam the enemy's radar and alert the aircraft about the missile coming towards it.

The Rafale fighter jets would boost Indian IAF's capability, but the S-400 missile system from Russia by end of the next year will further strengthen the Indian Air Force.

Russia's S-400 missile system is also being purchased by China, but the spying by the Communist nation has compelled Russia to stop the delivery of this missile system. This is a big blow to China as it has already been isolated in the world and Russia is considered to be its friend.

The S-400 is the most powerful anti-aircraft missile system, designed to thwart and destroy all types of aircraft and powerful missiles. China was the first country in the world to have signed the S-400 missile system deal with Russia in 2014. The first consignment was also awarded to China in 2018, but Russia has now stopped its supply to China. Russia has reportedly caught some people providing confidential information to China.

Nothing has been stated officially by Russia, but China has understood the reason behind it. During Sino-India clashes at the Galwan Valley in Eastern Ladakh, Russia maintained equidistance from India and China. It was a diplomatic victory for India, which of late has come closer to America, as Russia chose to remain silent.

<https://zeenews.india.com/india/iaf-rafale-fighters-arrive-at-ambala-air-base-today-set-to-change-war-dynamics-2299145.html>

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Golden Arrows hit the bullseye: 7000-km journey for five Rafales, 13-year-long battle for the IAF

As they land at Ambala Air Force station, the Rafales will arrive victorious, winning finally for the IAF, the procurement battle it has been fighting for over a decade

By Pranav Kulkarni

New Delhi: The 7,000-odd km journey between France's Mérignac to their home squadron in Ambala is unarguably the easiest sortie Indian Air Force's (IAF) newly-acquired Rafales have undertaken so far. Because, as they land at Ambala, their base and the home to IAF's resurrected 17 Squadron 'Golden Arrows', what they will have left behind is not just a physical trajectory, but trails of a long-delayed and daunting journey that began 13 years ago.

MMRCA: The 'mother of all deals'

It all started in June 2007 under the United Progressive Alliance (UPA)-II government, when the Defence Acquisition Council (DAC), the country's apex decision-making body on defence procurements, cleared the Acceptance of Necessity (AON) for the procurement of 126 fighter jets under the name Medium Multi-role Combat Aircraft (MMRCA). The memories of Kargil conflict were fresh and the IAF was looking to replace its fleet of ageing fighters with new-age machines that would lead the force into the coming decades.



Touted as the 'mother of all deals', the mammoth procurement, then pegged at a whopping Rs 42,000 crore, had ambitious clauses aimed at boosting India's defence production industry. According to the initial terms, 18 of the aircraft were to come in flyaway condition from a global aviation major, while 108 others were to be manufactured in India under Transfer of Technology (ToT) with 50 per cent offset - simply meaning indigenous components. This was tweaked

specially for the program from the then existing 30 per cent (under the Defence Procurement Policy - DPP) and increased to 50.

Six contenders: Americans, Russians, Europeans, Swedes and the French

The Request for Proposal (RfP) for the procurement of the fighters was issued in August 2007 to six global contenders - Russia's MIG-35 (RAC MiG); Swedish SAAB JAS-39 (Gripen); Dassault Rafale (France); American F-16 Falcon (Lockheed Martin); Boeing's F/A-18 Super Hornet and Eurofighter Typhoon, made by a consortium of British, German, Spanish and Italian firms.

But this was just the beginning of what was to be an ever-ongoing procurement of fighters even as the IAF struggled with depleting fighter squadrons. By 2010, the IAF's fighter squadrons were down to 32, from its stipulated size of 39.5 and the procurement of the fighters was nowhere in sight.

After exhaustive technical trials in the deserts of Rajasthan and icy peaks of Leh, it was declared in May 2009 that four of the six aircraft failed to display desired performance in high-altitude trials. By early 2011, only two of the six contenders - Eurofighter Typhoon and Dassault Rafale remained in the competition, much to the disappointment of the Americans, Russians and the Swedes.

Rafale emerges as the winner, but the Congress-led government had 'no money'

In January 2012, almost five years after floating it and after the conclusion of technical trials and contract negotiations, the Defence Ministry headed by AK Antony announced that Rafale had emerged as L-1, the lowest bidder in the race between Eurofighter and Dassault. Interestingly, on that day, the shares of Dassault Aviation soared by 20 per cent on the Paris stock exchange, their peak in four years. But, seems that the investors were arguably clueless about the red-tapism that engulfed India's defence procurements, at least in 2012.

And for the IAF, the wait was far from over even as the cost of the contract had already escalated to almost double - from about \$12 billion to almost \$28 billion. While decision-makers in South Block kept stressing that contract negotiations, which, for the first time in India's procurement history, also included life cycle costs, were taking time. Despite numerous speculations and reports that the deal could be sealed any moment, no contract was signed in 2012 or 2013.

By 2014, the UPA was staring at an uncertainty fearing a clean sweep under the Modi-wave, and the MMRCA was the last priority of the outgoing government. But it wasn't without Antony's parting remarks that the UPA-II unofficially buried the MMRCA deal. In February 2014, while addressing a press conference, Antony said that 'there is no money left in the current fiscal' for major procurements. Come May and Antony was former defence minister. South Block had changed.

Defence Minister Manohar Parrikar scraps the MMRCA deal

In July 2015, within just over a year after coming to power, the BJP-led government scrapped the UPA-issued RfP, but retained Rafale, the IAF's preferred and zeroed-down choice for the fighter. In April that year, PM Narendra Modi announced that 36 Rafale jets would be bought from France in flyaway condition.

In June 2016 - after a nine-year wait for the IAF - PM Modi signed an Inter-Governmental Agreement (IGA) with France to procure 36 Rafale jets at a cost of Rs 58,000 crore. The IGA had clauses completely different from the MMRCA.

Rahul Gandhi's 'manufactured' Rafale controversy

The Congress party returned to Rafale only in 2018 when politics drove it to look skywards. Staring at the next general elections, Congress, led by then-president Rahul Gandhi, alleged that there was 'corruption' in the Rafale deal. Gandhi alleged that the government had extended undue favours to Anil Ambani-led Reliance Defence, the Indian offset partner for Dassault.

While the BJP dismissed the allegations calling the claims a 'manufactured' scam, in December 2018, the Supreme Court dismissed PILs filed by Prashant Bhushan, Arun Shourie and Yashwant

Sinha seeking a court-monitored probe into the Rafale deal. Then CJI Ranjan Gogoi said that the court "sees no reason to intervene" in the matter. In what also proved the futility of allegations from an electoral point of view, Congress' ally NCP's chief Sharad Pawar then said that Indian people did not doubt PM Modi's integrity.

Rafale just the beginning as IAF still continues to operate with 30 operational squadrons

As the first five fighters arrive in India, having concurred the political-bureaucratic-diplomatic delays, unarguably the only battles the Rafale jets are incapable of winning, they will be carrying forward the IAF's historic bonds with French Jaguar and Mirage fighters.

But the woes of India's air warriors are far from over. The IAF continues to operate with 30 fighter squadrons against its sanctioned strength of 42, thanks to historic delays. While the DAC under Rajnath Singh has already cleared the procurement of MiG-29s, upgradation of 59 existing MiG-29s and procurement of 12 Su-30MKIs, other ongoing inductions, including that of home-grown Light Combat Aircraft (LCA) Tejas with its IOC/ FOC versions, remains work-in-progress.

The first flight of ongoing Advanced Medium Combat Aircraft (AMCA) is unlikely before 2032. But, with a stress on the tri-services integration and a two-front war along the northern frontiers, the Rafales are all set to be IAF's backbone. But, for the time being, the Golden Arrows have hit the bullseye.

<https://www.timesnownews.com/india/article/rafale-jet-ambala-today-iaf-station-golden-arrows-17-squadron-dassault-aviation/628703>



Wed, 29 July 2020

As Rafale takes off for India, Here's why it can become a deadly combo with Sukhoi Su-30MKI

Once the Su-30MKI and the Rafale start operating together, it will be a potent combination against our adversaries, be it Pakistan or anybody else, said RKS Bhadauria

By Ajit Garg

The first batch of five Rafale jets have started their 7000-km long journey to India from the airbase in France. The two-day journey of the much-awaited Dassault-made fighter jets will conclude in Ambala, Haryana, where they will officially join the Indian Air Force on July 29.

The fighter jets will have a stop over at UAE's Al Dhafra Air Base and there will be air-to-air refueling on the way before the twin-engine multi-role, nuclear capable fighter aircraft reach their final destination.

India has been long awaiting these advanced Dassault Rafale jets to enhance their firepower exponentially, especially after the Balakot episode.

Speaking on the sidelines of the Indo-French joint Air Exercise Garuda-VI, Indian Air Force Air Chief Air Marshal RKS Bhadauria (Then Vice Air Chief) warned enemies, including Pakistan of deadly combination of Sukhoi Su-30MKI and Rafale MMRCA fighter jets.



Dassault Rafale and IAF Sukhoi Su-30MKI (Pic Credit: IAF/ XAirForces)

"Once the Su-30MKI and the Rafale start operating together, it will be a potent combination against our adversaries, be it Pakistan or anybody else. It will be a potent capability. Any adversary would be worried about such a combination," said Bhadauria during the Garuda exercise. Bhadauria was the head of the Indian team that negotiated with France for the deal to acquire 36 Rafale jets in 2016. "For any such (February 27-type) operation by Pakistan, they would have losses much more. We would have larger weapons and we would have better weapons. The

attrition that we will inflict would be very very high," Vice Chief added. Prime Minister Narendra Modi has also said that Rafale could have inflicted more damage on the terror camps had Rafale been in the force. In March 2019, PM said that the entire country is feeling the absence of Rafale fighter jet aircraft. The Russia-made Sukhoi Su-30MKI is currently the most potent fighter jet in the IAF's arsenal and experts believe that combined with the Rafale, India's airpower will be increased exponentially. Here's a brief look at both the aircrafts:

Dassault Rafale

India had signed an inter-governmental agreement with France in September 2016 for procurement of 36 Rafale fighter jets at a cost of around Rs 58,000 crore. The aircraft is capable of carrying a range of potent weapons and missiles and the first squadron of the aircraft will be deployed at Ambala air force station, considered one of the most strategically located bases of the IAF. The Indo-Pak border is around 220 km from there. The second squadron of Rafale will be stationed at Hasimara base in West Bengal. The Rafale is a modern fighter jet known for its agility, speed, weapon holding capacity and attack capability. The Dassault Rafale has a delta wing design and is capable of g-forces as high as 11g (in case of emergency). The Rafale is available in both single and dual seating cabin (India ordered 28 single and 8 dual seater Rafale).

Sukhoi Su-30MKI

The Sukhoi Su-30MKI is the most advanced fighter jet in operation with the Indian Air Force and is the primary air to air and air to ground strike machine. Also known as Flanker (NATO), the Su-30 MKI is built in India by HAL under a license agreement with Russia's Sukhoi. The Su-30MKI is exclusively used by India and there's an estimate that IAF has 290 operational units of 30MKI till now. The first unit was inducted in 2002. The Sukhoi Su-30MKI has a top speed of Mach 2 (2120 kmph) and has a maximum takeoff weight of 38,800 kg. The jet can carry a wide range of equipment from radars to missiles, bombs and event rockets.

<https://www.news18.com/news/auto/as-rafale-takes-off-for-india-heres-why-it-can-become-a-deadly-combo-with-sukhoi-su-30mki-2737393.html>



Wed, 29 July 2020

One for the road: Air Force shows Rafales re-fuelling mid-air on way home

The Rafale fighter jets built by Dassault Aviation -- and piloted by officers from the Indian Air Force -- took off from Merignac in southwest France on Monday

By Vishnu Som

New Delhi: In photos posted by the Indian Air Force on Twitter, India's first batch of Rafale fighter jets are seen re-fuelling mid-air from a French Air Force tanker before their scheduled stopover at the Al-Dhafra air base in the United Arab Emirates.

The jets built by Dassault Aviation - and piloted by officers from the Indian Air Force - took off from Merignac in southwest France, the company said in a statement.

By Wednesday, after a 7,000-km journey with the UAE pit-stop, they should be at the Ambala air base in India, some 200 kilometres from the Pakistani and Chinese borders.

They are accompanied by two A330 Phoenix MRTT refuelling planes from the French Air Force.

Delivery of the Rafale jets - 36 of which were ordered by India in September 2016 - officially began in October but the planes stayed in France for training of the pilots and mechanics. Delivery should be complete by 2022.

The five jets are the first of a batch purchased in a controversial Rs 59,000-crore inter-governmental deal by New Delhi which hopes to rapidly deploy the aircraft amid simmering tensions with China.

The Air Force has said that once the planes arrive in India, "efforts will focus on operationalisation of the aircraft at the earliest."

The Rafale fighter jets are capable of carrying a range of highly effective weapons, including the Meteor air-to-air missile and Scalp cruise missile.

The Rafale jets will come with various India-specific modifications, including Israeli helmet-mounted displays, radar warning receivers, low-band jammers, 10-hour flight data recording, infra-red search and tracking systems among others. *(With inputs from agencies)*

<https://www.ndtv.com/india-news/indian-air-force-shows-rafale-fighter-jets-re-fuelling-mid-air-on-way-home-2270187>

hindustantimes

Wed, 29 July 2020

Disengagement complete at most locations, claims China

China's foreign ministry, asked about the status at Ladakh friction points, had claimed that disengagement had been completed in most areas

By Suthirho Patranobis and Rahul Singh

Beijing/New Delhi: Indian and Chinese front-line troops have completed disengagement at most locations on the border, China said on Tuesday -- a statement Indian Army officers described as a play of words that did not reflect the full picture on the ground.

The Chinese foreign ministry was giving an update on the disengagement of border troops following last Friday's three-hour meeting of the Working Mechanism for Consultation and Coordination (WMCC) on border affairs, which met to review the situation in the border areas and the disengagement process in the western sector of the Line of Actual Control (LAC).



An Indian Army convoy moves along a highway leading to Ladakh, at Gagangeer in Kashmir's Ganderbal district(Reuters)

Responding to a specific query on whether Indian and Chinese soldiers had completed disengagement at Galwan Valley, Hot Springs and Gogra areas, foreign ministry spokesperson Wang Wenbin said disengagement was completed in most areas. India's external affairs ministry did not comment on the matter.

"The front-line frontier defence forces of the two countries have disengaged in most locations, and the current situation continues to develop in the direction of easing and cooling," he said.

But Indian Army officers said the locations did not really cover the key areas of conflict.

"Completed disengagement at "most locations" reveals there are locations where the process hasn't made significant progress. Disengagement at Pangong Tso and Patrolling Point-17 (Gogra) hasn't been up to the desired level," an Indian Army officer aware of the matter said on condition of anonymity.

Differences between India and China on the disengagement process along the LAC emerged following the meeting last Friday, with New Delhi calling on Beijing to "sincerely implement" the understandings on troop withdrawals reached by senior military commanders of the two sides.

"Recently China and India have conducted intensive communication through military and diplomatic channels. We have held four rounds of commander level talks and three meetings of WMCC," Wang said on Tuesday.

“Now we are preparing for the fifth round of commander level talks to study the settlement of the remaining issue. We hope India will work with China to implement our consensus and uphold peace and stability along our border areas,” he added.

The commander-level talks are likely to be held later this week.

Following last Friday’s WMCC meeting, a statement from the Indian external affairs ministry said the two sides agreed “it was necessary for both sides to sincerely implement the understandings reached between senior [military] commanders in their meetings till date”.

India at the WMCC meeting focused on the need for China to completely withdraw its forces from key friction points in Ladakh sector in keeping with commitments made at the meetings of the corps commanders and the July 5 phone conversation between the two Special Representatives on the border issue, people aware of the matter told HT in New Delhi.

It is still not clear whether Beijing is looking at the disengagement of troops in the same way.

The Chinese statement on the same WMCC meeting, issued in Beijing in Mandarin, referred to “positive progress made by the front-line border defence forces of the two countries to disengage and ease the situation on the ground”.

Northern Army commander Lieutenant General YK Joshi last week said that disengagement between forward deployed Indian and Chinese soldiers from friction areas along the contested Line of Actual Control (LAC) was a “complex and intricate process” that required “diligent execution”.

Joshi said disengagement was being verified on the ground to “ensure its veracity and correctness.” He said de-escalation of the border conflict would begin after complete disengagement.

<https://www.hindustantimes.com/india-news/disengagement-complete-at-most-locations-claims-china/story-8BO8Qt2W0oalznWnWz86JL.html>

hindustantimes

Wed, 29 July 2020

Indian Navy’s clear message to Beijing following escalation of border tension ‘registered’ by China: Report

The Indian Navy deployed a range of its frontline warships and submarines in the Indian Ocean Region(IOR) to send a clear message to China when the border tension escalated manifold in the wake of the Galwan Valley clashes on June 15

New Delhi: The Indian Navy’s clear message to Beijing through its aggressive deployment of almost all frontline warships and submarines in the Indian Ocean Region following escalation in the border row in eastern Ladakh has been “registered” by China, top defence sources said on Tuesday.

The Indian Navy deployed a range of its frontline warships and submarines in the Indian Ocean Region(IOR) to send a clear message to China when the border tension escalated manifold in the wake of the Galwan Valley clashes on June 15.

The sources told PTI that the government adopted a multi-pronged approach involving the Army, the Indian Air Force(IAF) and the Navy as well diplomacy and economic measures to send a clear signal to China that its misadventure in eastern Ladakh was not acceptable at all.



INS Jalashwa, deployed by the Indian Navy for Operation Samudra Setu, entered Tuticorin harbour early morning.(PTI)

They said the three service chiefs are engaged in deliberations on almost a daily basis to ensure a coordinated approach in dealing with the situation as well as to make China understand about India's clear message.

The sources said the three services are coordinating on the military response to the border row.

The Navy has significantly expanded its deployment in the IOR deploying a plethora of warships and submarines to create pressure points on China as the maritime space around the Malacca Strait is very critical for its supply chain through sea routes.

"Yes, our message has been registered by China," said a source without elaborating.

Asked whether China has responded to India's deployment, the sources said there was no visible increase in forays by Chinese ships in the IOR.

They said the reason could be the PLA Navy's excessive deployment of resources in the South China Sea following the strong opposition by the US to Beijing's expansive territorial claims in the region.

The US sent a number of its warships to the South China Sea to demonstrate freedom of navigation and rallying support to countries who have territorial disputes with China over the region.

The Indian Navy is also ramping up its operational cooperation with various friendly naval forces like the US Navy and Japan Maritime Self Defense Force in view of the fast evolving regional security landscape.

Following the Galwan Valley clashes, the IAF deployed almost all its frontline fighter jets like Sukhoi 30 MKI, Jaguar and Mirage 2000 aircraft in the key frontier air bases in eastern Ladakh and elsewhere along the Line of Actual Control(LAC).

The IAF has been carrying out night time combat air patrols over the eastern Ladakh region in an apparent message to China that it was ready to deal with any eventualities in the mountainous region. The Army significantly enhanced deployment after the clashes in Galwan Valley that left 20 Indian soldiers dead.

The Chinese side also suffered casualties but it is yet to give out the details. According to an American intelligence report, the number of casualties on the Chinese side was 35.

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

After the last round of military talks, government sources said the Indian side conveyed a "very clear" message to the Chinese army that status quo ante must be restored in eastern Ladakh and it will have to follow all mutually agreed protocols for border management to bring back peace and tranquillity.

<https://www.hindustantimes.com/india-news/indian-navy-s-clear-message-to-beijing-following-escalation-of-border-tension-registered-by-china-report/story-IFYTm6P5a6PALOggL2UAPL.html>

Navy deploys large number of ships in Indian Ocean to send clear ‘message’ to China

Since tensions in Ladakh began, three service chiefs have been meeting regularly to plan military strategies

By Snehesh Alex Philip

New Delhi: Amid the stand-off with China in Ladakh, the Indian Navy has deployed a large number of ships under the Eastern and Western Naval Commands in the Indian Ocean region to send out a clear “message” to China, ThePrint has learnt.

Sources in the defence and security establishment said that the “message has been registered” by China.

They added that the three service chiefs have been meeting regularly since the border tensions in Ladakh started simmering from early May and all military strategies are being planned jointly.

As reported by ThePrint, the development comes as the Indian military is preparing to respond to Chinese aggression in a joint manner keeping in mind the possible collusion of China and Pakistan.

“India has reacted in all domains to counter China and to tell her that what she has done is unacceptable. This involves the Army, Navy, Air Force, diplomacy and even economics,” a top government official said.

The official added that the ships have been deployed to send out a message.

Message ‘registered’ by China

Asked if this message has been received by China, the official said: “Yes. China has picked up the message. It has registered”.

The official, however, refused to get into the details of what the message was and how he was sure that the message was received.

China has always been concerned about India possibly blocking the Malacca Strait through which 80 per cent of the Chinese goods travel by sea, including petroleum.

Sources said that the Indian Navy has not spotted any “alarming” movement by the Chinese PLA Navy so far.

ThePrint had earlier reported that additional ships have been deployed by the Navy, but the extent of the deployment could only be known now.

The Navy has also gone in for emergency procurement of “niche equipment”, details of which are being withheld for operational secrecy.

New plans for Andaman and Nicobar Command

Government sources said that one of the key bases for India is the Andaman and Nicobar Command (ANC), the only tri-service Command of India.

They said that a lot of plans are in the works to fully exploit the capability of the Command, which gives India closer accessibility to the Malacca Strait.

The Indian Air Force has also sent its maritime strike variant of Jaguar fighters to the Car Nicobar Air Base under the ANC as part of the preparedness.

From this Command, the Navy has the ability to dominate the Malacca Strait.

The Eastern Naval Command had earlier carried out a major exercise under the area of operation of the ANC and a Passex Exercise with the US in the same waters.

<https://theprint.in/defence/navy-deploys-almost-all-operational-ships-in-indian-ocean-to-send-clear-message-to-china/469833/>

Indian Navy deepens watch to check China ambitions

The multiple routes that China could be looking at to enter the Indian Ocean are further south of Malacca and include the Sunda, Lombok, Ombai and Wetar straits, said a second Indian Navy officer who asked not to be named
By Rahul Singh

New Delhi: The Indian Navy has stepped up surveillance and activities in the Indian Ocean Region (IOR), which, it believes, China will “inevitably” try to enter in its quest to become a global power, just as it has laid claim to large portions of the disputed South China Sea, according to a top officer aware of the developments.

It is to deal with this scenario that India reached out to neighbours in IOR — Maldives, Mauritius, Seychelles and Madagascar, to prevent China from expanding its footprint in the region by creating more bases — and like-minded navies, such as those of the United States and Japan, over the last two months, he added.

“It is inevitable that the Chinese People’s Liberation Army-Navy (PLAN) will come to IOR if China wants to become a global power. They are opening multiple routes to the Indian Ocean to overcome the Malacca Dilemma (China’s strategic weakness),” the officer said, speaking on the condition of anonymity.

The comments come at a time when there are heightened military tensions in eastern Ladakh — where Indian and Chinese forces are locked in a tense border confrontation and disengagement along the Line of Actual Control (LAC) has turned out to be a challenging process — and China is militarising the South China Sea.

The Malacca Dilemma refers to China’s apprehension of major naval powers controlling the Malacca Strait between Malaysia and Indonesia and interdicting vital supply lines. A significant volume (more than 80%) of China’s oil imports pass through the strait connecting the Indian Ocean and the South China Sea.



The Malacca Dilemma refers to China’s apprehension of major naval powers controlling the Malacca Strait between Malaysia and Indonesia and interdicting vital supply lines. (PTI file photo for representation)

The multiple routes that China could be looking at to enter the Indian Ocean are further south of Malacca and include the Sunda, Lombok, Ombai and Wetar straits, said a second Indian Navy officer who asked not to be named.

“It’s a reality that the PLAN will deploy in the Indian Ocean once its power crosses a certain threshold. Right now, it’s good enough for the South China Sea,” said Admiral Arun Prakash (retd), a former navy chief.

India is keeping tabs on China’s aggressive moves in the South China Sea and taking steps to ensure that the Chinese navy doesn’t muscle its way into the Indian Ocean where combat-ready Indian warships are carrying out round-the-clock surveillance for any unusual activity, said the first officer.

Over the last one month, the navy has conducted joint drills with a US Navy carrier strike group, led by USS Nimitz, and Indian and Japanese warships have carried out exercises in the Indian Ocean, against the backdrop of the India-China border standoff in Ladakh.

The India-US exercise involving eight Indian and US warships took place a week ago at a time when tensions have mounted over China's activities in South China Sea, where the US Navy recently conducted a major exercise that involved two carrier strike groups.

From carrying out naval drills with like-minded countries to reaching out to states in the Indian Ocean region, the Indian Navy is focusing on checking China's rising ambitions in the region and sending out a strong message that Beijing's power play in South China Sea cannot be replicated in the Indian Ocean.

"China is claiming almost 90% of the South China Sea. We don't want that scenario unfolding in the Indian Ocean. We will not allow China to have it easy coming here," said the second officer.

China's step-by-step inroads into "territorialising" the South China Sea find echoes in some parts of IOR, not by trumped up claims because that would be blatant neo-colonialism but with more sophistication, said naval affairs expert Rear Admiral Sudarshan Shrikhande (retd)

"Its (China's) diplomacy and economic influence when combined with port investments, logistics bases, all of which could be for dual-use and their sustained deployments in the IOR, are of serious concern," Shrikhande said.

The stage is also set for Australia to be part of the next Malabar naval exercise conducted by India with the US and Japan, as reported by Hindustan Times on July 17. The next edition of Malabar, already delayed by the Covid-19 pandemic, is set to be held by the end of the year.

China has also been wary of the Quadrilateral security dialogue, or Quad, that was revived in late 2017 by India, the US, Australia and Japan, and these suspicions have increased since the four countries upgraded the forum to the ministerial level last year.

"We are already operating with these navies. We don't need time to put the Quad into effect if the government gives us the go-ahead... It's not that we are aligning with the US. Our actions are guided by national interest and what you see unfolding is issue-based convergence of interests," said the first officer.

China began deploying troops to its first overseas naval base at Djibouti in the Horn of Africa in July 2017, in what some global experts said was the outcome of Beijing's 'debt-trap diplomacy'. Mounting debts have led countries such as Sri Lanka, the Maldives and Pakistan to give control of territories, which are of strategic significance, to China.

The base in Djibouti has shored up China's capabilities to sustain naval units in the Indian Ocean.

"In recent months, with much of the world preoccupied with the Covid-19 pandemic, China has sharply escalated its coercive activities. In early April, a Chinese Coast Guard vessel sank a Vietnamese fishing boat close to islands claimed by both China and Vietnam. A Chinese marine survey vessel harassed a Malaysian oil exploration vessel off Borneo. This month, the [US] department of defense voiced concern about the Chinese navy's decision to seal off an area around the Paracel Islands to conduct naval exercises. In response, the United States increased its own naval activities, including joint exercises by two aircraft carrier groups," the New York Times said in an editorial on Monday.

The Indian Navy has been on an operational alert in the Indian Ocean where scores of warships are ready for any task in the aftermath of the border row. It has positioned warships along critical sea lanes of communications and choke points and the vessels could be diverted for any mission.

Indian warships are deployed from as far as the Persian Gulf to the Malacca Strait and northern Bay of Bengal to the southeast coast of Africa.

While the Indian Navy is keeping a sharp eye on the Indian Ocean, it is also playing a key role in the Ladakh sector.

The navy's P-8I maritime patrol and reconnaissance aircraft, imported from the US, are being used for surveillance of the Ladakh sector and gathering intelligence on Chinese deployments across the contested LAC.

The primary role of the P-8Is encompasses carrying out anti-submarine warfare, anti-surface warfare, and intelligence, surveillance and reconnaissance of the oceans.

<https://www.hindustantimes.com/india-news/navy-deepens-watch-to-check-china-ambitions/story-ZfnCd24w0qR4nRY8XzRyjM.html>



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Jammu and Kashmir: Indian Army, BSF, CRPF no Longer require NOC for land acquisition

The J&K administration has asked District Collectors for land acquisition in their designated areas to process the land acquisition cases, henceforth, strictly in accordance with the provisions of these two Acts

Edited By Sharmita Kar

New Delhi: In a striking move since the bifurcation of the erstwhile state of Jammu and Kashmir, the administration of the now-union territory has withdrawn the 1971 circular, which mandated a No Objection Certificate (NOC) for the acquisition of land, for personnel in the Indian Armed Forces like Army, Air Force, Navy, BSF, and CRPF.

The Narendra Modi-led central government had, after the revocation of Article 370 of the Indian Constitution, announced that soon people will be able to buy land in the union territory of J&K. As a result, the 1971 circular, which restricted land acquisition and requisition without a NOC from the Home Department, has now been replaced by the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.

“In view of the extension of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 to the UT, the circular dates 27.08.1971, which prescribed obtaining of No Objection Certificate from the Home Department for acquisition/requisition of land in favour of Army, BSF/CRPF and similar organisations is hereby withdrawn,” the J&K administration said in a statement.

The decision comes days after the J&K administration gave its approval to amend the Control of Building Operations Act, 1988 and the J&K Development Act, 1970, that provides special dispensation to the Armed Forces for carrying out construction activities in “strategic areas”.

The administration has asked District Collectors for land acquisition in their designated areas to process the land acquisition cases, henceforth, strictly in accordance with the provisions of these two Acts.

What is Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013?

The Act, in consultation with institutions of local self-government or administration, accounts for land to be acquired “for strategic purposes relating to naval, military, air force, and armed forces of the Union, including central paramilitary forces or any work vital to national security or defence of India or State police, safety of the people” and states that the Centre is “the appropriate authority for acquisition of land”.

However, after a huge row over the amendment of the Act, the J&K administration has clarified that the move will allow construction in “strategic areas” only, where the Armed forces have “direct operational and training requirements”.

<https://www.india.com/news/india/jammu-and-kashmir-indian-army-bsf-crpf-no-longer-require-noc-for-land-acquisition-4096096/>

This Ashok Leyland 4x4 LSV Military vehicle is perfect to take on the worst terrains and weather conditions

Military vehicles have always been a fascination for auto enthusiasts around the world. The Indian Army has a few of the most stunning vehicles in their fleet that we can only dream. Out of all the providers for the Indian Arm, Ashok Leyland tops the list.

The company's arsenal of defence vehicles has impressive offerings including tracked vehicles, 6x6s, 8x8s, basic trucks to small 4x4 LCVs. One such iteration is what you see above.



What you see above is the Ashok Leyland 4x4 LSV, which is a light, specialist, troop mobility vehicle developed to operate in difficult terrains and adverse weather conditions. An armoured vehicle is fitted with an H6 engine that is mated to a 5-speed gearbox and a 2-speed unit for accessories.

It rides on independently suspended axles which are integrated with an electronically-controlled air suspension system. The same allows adjustment of ride height which can be decided according to the terrain beneath. Braking duties on the truck are handled by a hydraulic system that is governed by ABS. There is also STANAG protection on all four sides as well.

The vehicle is built upon a sturdy space frame chassis that can support a platform of up to 8 tons. It can carry a payload of 1 tonne and 5 occupants inside the cabin in addition to the same. A few of the most notable features of the car include a central tyre inflation system, a large protective plate under the cabin to protect the cabin from debris and perhaps deflect ammo. There's also a winch up front which can pull some heavy stuff.

Optional elements on the car come in the form of a water tank, a rear-view camera, a 360-degree rotatable gunners station with viewport & gun mount, provision for a weapons station, additional jerry cans, an antenna mount and a searchlight on the roof which can either be motorized or manually operated.

<http://www.indiandefensenews.in/2020/07/this-ashok-leyland-4x4-lsv-military.html>

MicroRNA shows promise for hair regrowth

Summary:

Researchers have identified a microRNA (miRNA) that could promote hair regeneration. This miRNA -- miR-218-5p -- plays an important role in regulating the pathway involved in follicle regeneration, and could be a candidate for future drug development.

Researchers from North Carolina State University have identified a microRNA (miRNA) that could promote hair regeneration. This miRNA -- miR-218-5p -- plays an important role in regulating the pathway involved in follicle regeneration, and could be a candidate for future drug development.

Hair growth depends on the health of dermal papillae (DP) cells, which regulate the hair follicle growth cycle. Current treatments for hair loss can be costly and ineffective, ranging from invasive surgery to chemical treatments that don't produce the desired result. Recent hair loss research indicates that hair follicles don't disappear where balding occurs, they just shrink. If DP cells could be replenished at those sites, the thinking goes, then the follicles might recover. A research team led by Ke Cheng, Randall B. Terry, Jr. Distinguished Professor in Regenerative Medicine at NC State's College of Veterinary Medicine and professor in the NC State/UNC Joint Department of Biomedical Engineering, cultured DP cells both alone (2D) and in a 3D spheroid environment. A spheroid is a three-dimensional cellular structure that effectively recreates a cell's natural microenvironment. In a mouse model of hair regeneration, Cheng looked at how quickly hair regrew on mice treated with 2D cultured DP cells, 3D spheroid-cultured DP cells in a keratin scaffolding, and the commercial hair loss treatment Minoxidil. In a 20-day trial, mice treated with the 3D DP cells had regained 90% of hair coverage at 15 days.

"The 3D cells in a keratin scaffold performed best, as the spheroid mimics the hair microenvironment and the keratin scaffold acts as an anchor to keep them at the site where they are needed," Cheng says. "But we were also interested in how DP cells regulate the follicle growth process, so we looked at the exosomes, specifically, exosomal miRNAs from that microenvironment." Exosomes are tiny sacs secreted by cells that play an important role in cell to cell communication. Those sacs contain miRNAs.

MiRNAs are small molecules that regulate gene expression. Cheng and his team measured miRNAs in exosomes derived from both 3D and 2D DP cells. In the 3D DP cell-derived exosomes, they pinpointed miR-218-5p, a miRNA that enhances the molecular pathway responsible for promoting hair follicle growth. They found that increasing miR-218-5p promoted hair follicle growth, while inhibiting it caused the follicles to lose function.

"Cell therapy with the 3D cells could be an effective treatment for baldness, but you have to grow, expand, preserve and inject those cells into the area," Cheng says. "MiRNAs, on the other hand, can be utilized in small molecule-based drugs. So potentially you could create a cream or lotion that has a similar effect with many fewer problems. Future studies will focus on using just this miRNA to promote hair growth."

Story Source:

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

Journal Reference:

1. Shiqi Hu, Zhenhua Li, Halle Lutz, Ke Huang, Teng Su, Jhon Cores, Phuong-Uyen Cao Dinh, Ke Cheng. **Dermal exosomes containing miR-218-5p promote hair regeneration by regulating β -catenin signaling.** *Science Advances*, 2020; 6 (30): eaba1685 DOI: [10.1126/sciadv.aba1685](https://doi.org/10.1126/sciadv.aba1685)
<https://www.sciencedaily.com/releases/2020/07/200727145808.htm>

ScienceDaily

Wed, 29 July 2020

Laser inversion enables multi-materials 3D printing

Summary:

Selective laser sintering is one of the most widely used processes in additive manufacturing, but it is limited to printing with a single material at a time. Robotics engineers have now developed a new approach to overcome this limitation: By inverting the laser so that it points upwards, they've invented a way to enable SLS to use -- at the same time -- multiple materials.

Additive manufacturing -- or 3D printing -- uses digital manufacturing processes to fabricate components that are light, strong, and require no special tooling to produce. Over the past decade, the field has experienced staggering growth, at a rate of more than 20% per year, printing pieces that range from aircraft components and car parts to medical and dental implants out of metals and engineering polymers. One of the most widely used manufacturing processes, selective laser sintering (SLS), prints parts out of micron-scale material powders using a laser: the laser heats the particles to the point where they fuse together to form a solid mass.

"Additive manufacturing is key to economic resilience," say Hod Lipson, James and Sally Scapa Professor of Innovation (Mechanical Engineering). "All of us care about this technology -- it's going to save us. But there's a catch."

The catch is that SLS technologies have been limited to printing with a single material at a time: the entire part has to be made of just that one powder. "Now, let me ask you," Lipson continues, "how many products are made of just one material? The limitations of printing in only one material has been haunting the industry and blocking its expansion, preventing it from reaching its full potential."

Wondering how to solve this challenge, Lipson and his PhD student John Whitehead used their expertise in robotics to develop a new approach to overcome these SLS limitations. By inverting the laser so that it points upwards, they invented a way to enable SLS to use -- at the same time -- multiple materials. Their working prototype, along with a print sample that contained two different materials in the same layer, was recently published online by *Additive Manufacturing* as part of its December 2020 issue.

"Our initial results are exciting," says Whitehead, the study's lead author, "because they hint at a future where any part can be fabricated at the press of a button, where objects ranging from simple tools to more complex systems like robots can be removed from a printer fully formed, without the need for assembly."

Selective laser sintering traditionally has involved fusing together material particles using a laser pointing downward into a heated print bed. A solid object is built from the bottom up, with the printer placing down a uniform layer of powder and using the laser to selectively fuse some material in the layer. The printer then deposits a second layer of powder onto the first layer, the

laser fuses new material to the material in the previous layer, and the process is repeated over and over until the part is completed.

This process works well if there is just one material used in the printing process. But using multiple materials in a single print has been very challenging, because once the powder layer is deposited onto the bed, it cannot be unplaced, or replaced with a different powder.

"Also," adds Whitehead, "in a standard printer, because each of the successive layers placed down are homogeneous, the unfused material obscures your view of the object being printed, until you remove the finished part at the end of the cycle. Think about excavation and how you can't be sure the fossil is intact until you completely remove it from the surrounding dirt. This means that a print failure won't necessarily be found until the print is completed, wasting time and money."

The researchers decided to find a way to eliminate the need for a powder bed entirely. They set up multiple transparent glass plates, each coated with a thin layer of a different plastic powder. They lowered a print platform onto the upper surface of one of the powders, and directed a laser beam up from below the plate and through the plate's bottom. This process selectively sinters some powder onto the print platform in a pre-programmed pattern according to a virtual blueprint. The platform is then raised with the fused material, and moved to another plate, coated with a different powder, where the process is repeated. This allows multiple materials to either be incorporated into a single layer, or stacked. Meanwhile, the old, used-up plate is replenished.

In the paper, the team demonstrated their working prototype by generating a 50 layer thick, 2.18mm sample out of thermoplastic polyurethane (TPU) powder with an average layer height of 43.6 microns and a multi-material nylon and TPU print with an average layer height of 71 microns. These parts demonstrated both the feasibility of the process and the capability to make stronger, denser materials by pressing the plate hard against the hanging part while sintering.

"This technology has the potential to print embedded circuits, electromechanical components, and even robot components. It could make machine parts with graded alloys, whose material composition changes gradually from end to end, such as a turbine blade with one material used for the core and different material used for the surface coatings," Lipson notes. "We think this will expand laser sintering towards a wider variety of industries by enabling the fabrication of complex multi-material parts without assembly. In other words, this could be key to moving the additive manufacturing industry from printing only passive uniform parts, towards printing active integrated systems."

The researchers are now experimenting with metallic powders and resins in order to directly generate parts with a wider range of mechanical, electrical, and chemical properties than is possible with conventional SLS systems today.

Story Source:

[Materials](#) provided by [Columbia University School of Engineering and Applied Science](#). Original written by Holly Evarts. *Note: Content may be edited for style and length.*

Journal Reference:

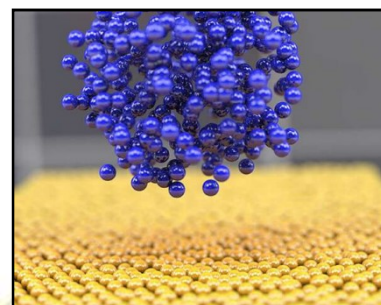
1. John Whitehead, Hod Lipson. **Inverted multi-material laser sintering**. *Additive Manufacturing*, 2020; 36: 101440 DOI: [10.1016/j.addma.2020.101440](https://doi.org/10.1016/j.addma.2020.101440)
<https://www.sciencedaily.com/releases/2020/07/200727145805.htm>

Rare glassy metal discovered during quest to improve battery performance

By Sarah Neumann

Materials scientists studying recharging fundamentals made an astonishing discovery that could open the door to better batteries, faster catalysts and other materials science leaps.

Scientists from the University of California San Diego and Idaho National Laboratory scrutinized the earliest stages of lithium recharging and learned that slow, low-energy charging causes electrodes to collect atoms in a disorganized way that improves charging behavior. This noncrystalline "glassy" lithium had never been observed, and creating such amorphous metals has traditionally been extremely difficult.



New research describes the evolution of nanostructural lithium atoms (blue) depositing onto an electrode (yellow) during the battery charging operation. Credit: University of California - San Diego

The findings suggest strategies for fine-tuning recharging approaches to boost battery life and—more intriguingly—for making glassy metals for other applications. The study was published on July 27 in *Nature Materials*.

Charging knowns, unknowns

Lithium metal is a preferred anode for high-energy rechargeable batteries. Yet the recharging process (depositing lithium atoms onto the anode surface) is not well understood at the atomic level. The way lithium atoms deposit onto the anode can vary from one recharge cycle to the next, leading to erratic recharging and reduced battery life.

The INL/UC San Diego team wondered whether recharging patterns were influenced by the earliest congregation of the first few atoms, a process known as nucleation.

"That initial nucleation may affect your battery performance, safety and reliability," said Gorakh Pawar, an INL staff scientist and one of the paper's two lead authors.

Watching lithium embryos form

The researchers combined images and analyses from a powerful electron microscope with liquid-nitrogen cooling and computer modeling. The cryo-state electron microscopy allowed them to see the creation of lithium metal "embryos," and the computer simulations helped explain what they saw.

In particular, they discovered that certain conditions created a less structured form of lithium that was amorphous (like glass) rather than crystalline (like diamond).

"The power of cryogenic imaging to discover new phenomena in materials science is showcased in this work," said Shirley Meng, corresponding author and researcher who led UC San Diego's pioneering cryo-microscopy work. Meng is a professor of NanoEngineering, and Director of UC San Diego's Sustainable Power and Energy Center, and the Institute for Materials Discovery and Design. The imaging and spectroscopic data are often convoluted, she said. "True teamwork enabled us to interpret the experimental data with confidence because the computational modeling helped decipher the complexity."

A glassy surprise

Pure amorphous elemental metals had never been observed before now. They are extremely difficult to produce, so metal mixtures (alloys) are typically required to achieve a "glassy" configuration, which imparts powerful material properties.

During recharging, glassy lithium embryos were more likely to remain amorphous throughout growth. While studying what conditions favored glassy nucleation, the team was surprised again.

"We can make amorphous metal in very mild conditions at a very slow charging rate," said Boryann Liaw, an INL directorate fellow and INL lead on the work. "It's quite surprising."

That outcome was counterintuitive because experts assumed that slow deposition rates would allow the atoms to find their way into an ordered, crystalline lithium. Yet modeling work explained how reaction kinetics drive the glassy formation. The team confirmed those findings by creating glassy forms of four more reactive metals that are attractive for battery applications.

The research results could help meet the goals of the Battery500 consortium, a Department of Energy initiative that funded the research. The consortium aims to develop commercially viable electric vehicle batteries with a cell level specific energy of 500 Wh/kg. Plus, this new understanding could lead to more effective metal catalysts, stronger metal coatings and other applications that could benefit from glassy metals.

More information: Xuefeng Wang et al. Glassy Li metal anode for high-performance rechargeable Li batteries, *Nature Materials* (2020). [DOI: 10.1038/s41563-020-0729-1](https://doi.org/10.1038/s41563-020-0729-1)

Journal information: [Nature Materials](https://phys.org/news/2020-07-rare-glassy-metal-quest-battery.html)
<https://phys.org/news/2020-07-rare-glassy-metal-quest-battery.html>



Wed, 29 July 2020

Researchers complete first-ever chromosomal-level genome sequencing of a freshwater sponge

By Katie Willis

Scientists have completed the first chromosomal-level genome sequence for a freshwater sponge—offering insight into how the sponge has evolved over 600 to 800 million years, and possibly leading to genetic tools to tackle challenges in maintaining clean freshwater and human health.

"This research provides an amazing window into the genetic features of early animals—and helps us understand how they lived, and became so successful," said marine biologist Sally Leys, who was the senior author of the study.

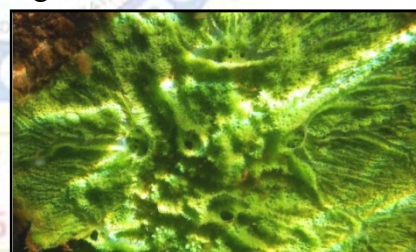
The sponge, called *Ephydatia muelleri*, can be found in almost any lake, river, pond or canal across the northern hemisphere. As filter feeders, freshwater sponges are integral for cleaning our waterways, and have evolved to live in extreme conditions over the last 30 million years.

"Sponges have almost twice as many genes as humans, and we only know what a fraction of these might do," said Nathan Kenny, a post-doctoral fellow at Oxford Brookes University in the United Kingdom who led the study.

"We don't have to go to space to find things that are alien to us—we can look at what the novel genes in sponges are doing," Kenny noted. "And because sponges are related to us, though very distantly, we might discover tricks sponges use to deal with problems such as controlling cell growth or protecting themselves from harmful bacteria, which then could be used to treat human diseases."

Currently, scientists have few tools to help assess what Earth's earliest animals were like, or how some animals adjusted to live in freshwater after originating in the oceans.

The researchers said this study provides foundational data that is critical for examining these problems in depth, including the near complete sequencing of the 23 individual chromosomes, as well as the identification of mechanisms that turn genes on or off and the method by which this



Scientists have completed the first-ever chromosomal-level genome sequencing of *Ephydatia muelleri*, a freshwater sponge found in lakes, rivers, ponds and canals. Credit: Sally Leys

sponge was able to transition to freshwater environments. The research also identified tiny microorganisms that live inside the sponges, helping them survive in freshwater.

The study, "Tracing Animal Genomic Evolution With the Chromosomal-Level Assembly of the Freshwater Sponge *Ephydatia muelleri*," was published in *Nature Communications*.

More information: Nathan J. Kenny et al. Tracing animal genomic evolution with the chromosomal-level assembly of the freshwater sponge *Ephydatia muelleri*, *Nature Communications* (2020). DOI: [10.1038/s41467-020-17397-w](https://doi.org/10.1038/s41467-020-17397-w)
<https://phys.org/news/2020-07-first-ever-chromosomal-level-genome-sequencing-freshwater.html>

COVID-19 Research News

live**mint**

Wed, 29 July 2020

India's first COVID-19 vaccine Covaxin: From trials to test results — key updates

By Anulekha Ray

- A 30-year-old man took the first dose of COVID-19 vaccine candidate at Delhi's AIIMS last week
- At least 375 people will participate in the first phases of clinical human trial of India's first COVID-19 vaccine

As the coronavirus cases top 1.6 crore globally, the scientists are leaving no stone unturned to develop a vaccine. Covaxin, India's first indigenous vaccine against the novel COVID-19, has already started its clinical human trial across the country. Developed by Bharat Biotech International Limited along with Indian Council of Medical Research and National Institute of Virology, Covaxin was the first COVID-19 vaccine candidate to get an approval from Drug Controller General of India (DCGI) in India.

In the first phase of human trial, Covaxin will be tested in 12 hospitals across the country. Volunteers between the ages of 18 and 55 with no co-morbidity conditions will participate in the trial. The vaccine trial have already begun in Hyderabad, Rohtak, Patna, Kancheepuram, Delhi, Goa and Bhubaneswar.

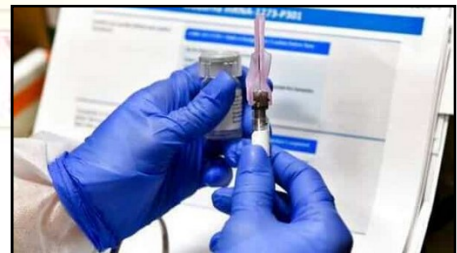
Here's all you need to know about the human trial of Covaxin:

No side-effect so far

A 30-year-old man took the first dose of COVID-19 vaccine candidate at Delhi's All India Institutes of Medical Sciences (AIIMS) last week as part of human trial. "No immediate side-effects have been observed so far," Dr Sanjay Rai, professor at the centre for community medicine at AIIMS said, according to news agency *PTI*.

Covaxin shows "encouraging" results in PGIMS Rohtak

The first phase of human trial of Covaxin was completed in PGIMS Rohtak. The hospital started trial on July 17 and around 50 volunteers enrolled for this exercise. "50 people across India were administered the vaccine and the results were encouraging," Dr Savita Verma, principal investigator of the vaccine trial team, told news agency *ANI*.



In the first phase of human trial, Covaxin will be tested in 12 hospitals across the country (AP)

Trial started in Bhubaneswar on Monday

The trial of 'Covaxin' began at the Institute of Medical Sciences and SUM Hospital in Bhubaneswar on Monday. Several people took the dose of coronavirus vaccine in the hospital, said Dr E Venkat Rao, principal investigator of the trial process.

How the first phase of human trial works

There are three formulations of the COVID-19 vaccine candidate. Each subject will be given any one of the formulation in two doses two weeks apart. The first 50 will get the lowest strength dose of the vaccine. If it is found to be safe in them, then it will be given to another 50 patients in high doses, Dr Rai told *PTI*.

What to expect from the first trial

At least 375 people will participate in the first phases of clinical human trial of India's first COVID-19 vaccine. More 3,500 volunteers have already enrolled for the trial.

"In the first phase, we see the safety of the vaccine which is of primary importance and the dose range is also calculated," AIIMS director Dr Randeep Guleria said.

How does Covaxin work?

Covaxin has been derived from a strain of the novel coronavirus isolated by the National Institute of Virology in Pune. Bharat Biotech developed an "inactivated" vaccine at its high-containment facility at Genome Valley in Hyderabad.

"Once the vaccine is injected into a human, it has no potential to infect or replicate, since it is a killed virus. It just serves to the immune system as a dead virus and mounts an antibody response towards the virus," Bharat Biotech said.

Second phase of trial:

The second phase of trial will be conducted on 750 volunteers. For phase II trial, people aged between 12-65 will be enrolled.

<https://www.livemint.com/news/india/india-s-first-covid-19-vaccine-covaxin-from-human-trials-to-test-results-key-updates-11595928884025.html>

hindustantimes

Wed, 29 July 2020

Process for human trial of Covid-19 vaccine begins in Kanpur hospital

The hospital has 36 volunteers between the age group of 18 and 55 years.

Five of the volunteers are women and two are 20-year-olds

By Haider Naqvi

The process for human trial of the Covid-19 vaccine that Bharat Biotech has developed formally began at a private hospital in Uttar Pradesh's Kanpur. The first set of participants, who have cleared the screening process, will be vaccinated on Thursday or Friday under medical supervision.

Prakhar Hospital, one of the two facilities chosen for testing the coronavirus vaccine in Uttar Pradesh, has 36 volunteers between the age group of 18 and 55 years. Five of the volunteers are women and two are 20-year-olds.

Coming from diverse backgrounds, the volunteers also include sportspersons. "They are mostly from middle class background and all of them registered on their own volition as they want to contribute to the experiment that can help mankind in these trying hours," said Dr JS Kushwaha, chairman of the hospital.

All 36 volunteers on Monday underwent a comprehensive process of determining their health status, which needs to fit in the parameters the Indian Council for Medical Research (ICMR) has

defined. Their blood samples and swabs were taken and sent to the ICMR certified laboratory for RT-PCR and anti-body test.

“On the basis of these reports, the vaccine will be given to them at the hospital positively by Thursday or Friday,” said Kushwaha. The hospital will conduct the human trials in two phases on 100 volunteers.

“People are regularly calling us and seek details of the process they will have to follow. Even today we got four calls from people, two of them women, and they wanted to be part of this trial,” he said.

Before the vaccine is given, the hospital will insure the volunteers meet all the specified conditions. A team of specialists, led by a doctor from All India Institute of Medical Sciences (AIIMS), will administer the vaccine and monitor the health parameters for a period of two hours at the hospital before the volunteers are allowed to leave.

The team will collect the blood samples on the 14th day and then on 28th day, these samples would be sent to the ICMR certified laboratory for the test.

Kushwaha said the hospital is well-equipped for such trials and has conducted similar trials for Rotavirus and Pentavalent vaccines in the past.

The hospital has received the go-ahead from the Data and Safety Monitoring Board and Central Drugs Standard Control Organisation to commence the trial. Kushwaha appealed to the people that they should come forward and get involved in the trial.

<https://www.hindustantimes.com/india-news/process-for-human-trial-of-covid-19-vaccine-begins-in-kanpur-hospital/story-xRNqNgiac3vQFBOT8sxfCK.html>

 **The Indian EXPRESS**

Wed, 29 July 2020

Covid-19 vaccine tracker: India at the centre of vaccine and Moderna's phase III trials

Coronavirus (COVID-19) vaccine tracker update: From today, a daily column to track laboratory research to field trials, publications and regulatory approvals, and also the logistical exercises of production and distribution of these vaccines

India one of the largest producers of vaccines

Irrespective of how the vaccine candidates developed by Indian companies eventually perform, India would remain a central player, both as one of the biggest manufacturers of vaccines in the world, and also one of the biggest markets. As pointed out by the Dr Balram Bhargava, director general of the Indian Council of Medical Research (ICMR), the other day, India controls nearly 60 per cent of the global supply of all kinds of vaccines.

Pune-based Serum Institute of India happens to be the largest manufacturer of vaccines in the world, and the company has entered an agreement to produce the vaccine being developed by Oxford University and AstraZeneca. That vaccine candidate is supposed to be the one that a lot of scientists and health experts are currently betting on. The vaccine is currently undergoing phase III trials in at least two countries and is about to get into similar late stage trials in India soon.

There are several other Indian pharmaceutical and biotechnology companies that are prominent players in the production and supply of vaccines. Hyderabad-based Bharat



Irrespective of how the vaccine candidates developed by Indian companies eventually perform, India would remain a central player, both as one of the biggest manufacturers of vaccines in the world, and also one of the biggest markets. (Reuters/File Photo)

Biotech, which is developing its own vaccine as well, Panacea Biotech, Shanta Biotech, Biological E Limited, are some of the other big names with large production capacities.

Irrespective of which vaccine gets ready first, a bulk of the production is likely to happen in India. These companies already have hold over a substantial chunk of the foreign markets. And this is likely to be more so during the current pandemic due to increasing distrust for Chinese companies in several countries, which are the biggest rivals.

Besides, as the second-most populous country in the world, India also happens to be one of the biggest markets for vaccines.

Moderna Therapeutics begins phase-III trials

As many of you might already be aware, more than 160 vaccines for novel Coronavirus, also known as SARS-CoV2, are currently being developed across the world. According to latest information from World Health Organisation, 25 candidate vaccines are in one of the three stages of human trials. These include the two being developed by Indian companies, Zydus and Bharat Biotech. As of today, another 139 are in pre-clinical evaluation, meaning that they are still being tried out on animals.

Some of these have excited the scientific world more than the others, for the promise that they have shown so far. The one being developed by US-based Moderna Therapeutics was the earliest mover, its phase-I human trials having started as early as middle of March. It has now completed phase-I and phase-II trials and, on Monday, entered phase-III trials, for which 30,000 volunteers have been roped in. Not all of them would be administered the vaccine. In phase-III trials, some of the volunteers are injected with the vaccine while the others are given a dummy. The volunteers do not know. They go about their normal lives, and after a few weeks, they are checked to see if they have been infected.

Researchers expect to see a significantly lower infection rate in the group that was given the vaccine. That is the test of the effectiveness of the vaccine. This process usually takes several months. The phase 3 of Moderna, technically, will complete in October 2022. However, whether the vaccine candidate will make the cut and become one of the first vaccines to be launched commercially early next year will depend largely on the preliminary data on efficacy, safety and immunogenicity that will emerge after the second dose is given to the volunteers on day 29 of the trials. Also, the levels of neutralising antibodies, that render the virus inactive, generated between day 1 and day 57, will be the most crucial data that researchers will closely watch.

Gennova to be third Indian firm to bring vaccine candidate

Pune-based Gennova Biopharmaceuticals is planning to start testing its candidate vaccine on human beings by October. Right now it is carrying out pre-clinical trials. Two Indian candidates have just begun phase-I clinical trials earlier this month. One of them is being developed by Hyderabad-based Bharat Biotech, in collaboration with Pune-based National Institute of Virology, which is part of the network of laboratories of the Indian Council of Medical Research. The other one is being developed by Ahmedabad-based Zydus Cadila.

Unlike the other two, Gennova is trying an mRNA vaccine, which is just one of the several ways in which vaccines trigger immune response in human beings against a virus. It involves injecting a messenger RNA that is coded to tell the cells to recreate a crucial part of the virus that the body needs to build immunity against.

The other two Indian candidate vaccines are taking different approaches. The Bharat Biotech vaccine will insert an 'inactivated' virus into the human beings to trigger the response system, while the one being developed by Zydus Cadilla uses a genetically engineered DNA molecule coded to make a replica of the virus. There are other ways to trigger the immune response.

<https://indianexpress.com/article/explained/covid-coronavirus-vaccine-update-6526457/>

COVID-19 vaccine phase 3 trials: Moderna, Pfizer hope to launch vaccines by year-end

Two experimental coronavirus vaccine developed by Moderna and Pfizer-BioNTech have entered late-stage, phase 3 trials with first study volunteers receiving the jabs on Monday

By Salome Phelamei

Key Highlights

- **Moderna and Moderna Inc and Pfizer launched the late-stage or phase 3 trials of their experimental vaccines against COVID-19**
- **The trials will evaluate the safety and efficacy of their coronavirus vaccine candidates - mRNA-1273 and BNT162b2**
- **More than 150 vaccines are being developed all over the world as scientists race against time to find a cure for the deadly disease**

Two of the most advanced experimental vaccines against the novel coronavirus have entered the late-stage studies on Monday (July 27) with Moderna Inc and Pfizer eyeing for year-end launches. Researchers plan to recruit 30,000 in separate phase 3 trials both supported by the US government's effort to accelerate development and production COVID-19 vaccines and treatments. If trials succeed, both the companies hope to launch their vaccines by the end of the year.

Moderna phase 3 COVE study to see if the vaccine works

The phase 3 trial, called the phase 3 COVE study, will evaluate whether the experimental vaccine (mRNA-1273) is safe and can prevent symptomatic COVID-19 in adults. The candidate vaccine co-developed by the Moderna and the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, will be tested on 30,000 adult volunteers who do not have the SARS-CoV-2 infection across US clinical research sites.

According to a Reuters report, citing US and company officials, Moderna's COVID-19 vaccine could be ready for widespread by the end of the year.

"Although face coverings, physical distancing and proper isolation and quarantine of infected individuals and contacts can help us mitigate SARS-CoV-2 spread, we urgently need a safe and effective preventive vaccine to ultimately control this pandemic," said NIAID Director Anthony S Fauci, MD.

Announcing the start of pivotal phase of their study in a press release on July 27, the company said that it has begun dosing first volunteers with its mRNA-1273 vaccine candidate.

"We are pleased to have started the Phase 3 COVE study," said Stephane Bancel, CEO at Moderna. "We are grateful to the efforts of so many inside and outside the company to get us to this important milestone. We are indebted to the participants and investigators who now begin the work of the COVE study itself. We look forward to this trial demonstrating the potential of our vaccine to prevent COVID-19, so that we can defeat this pandemic."

According to the NIH, volunteers will be given two intramuscular injections approximately 28 days apart. During the trial, the participants will be randomly assigned 1:1 to receive either two 100 microgram (mcg) injections of mRNA-1273 or two shots of a saline placebo. The trial is blinded, which means both the investigators and the participants won't know who is assigned to which group.

The primary goal of the trial is to evaluate the safety and determine whether the mRNA-1273 can prevent symptomatic COVID-19 after receiving two doses of the vaccine. The secondary goal involves evaluating if the vaccine prevents severe COVID-19 or laboratory-confirmed SARS-CoV-2 infection with or without disease symptoms. Trial participants will be closely monitored by investigators for safety.

Moderna said it remains on track to be able to deliver approximately 500 million doses per year and possibly up to 1 billion doses per year, beginning in 2021.

Pfizer & BioNTech choose lead mRNA vaccine candidate

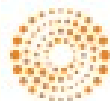
Pfizer and BioNTech have picked their BNT162b2 vaccine candidate against COVID-19 for the phase 2/3 study at a 30 µg dose level in a 2 dose regimen. The candidate vaccine was chosen after an extensive review of preclinical and clinical data from phase 1/2 clinical trials and in consultation with the US Food and Drug Administration's Center for Biologics Evaluation and Research (CBER) and other global regulators, said the companies in a release.

BNT162b2 encodes an optimized SARS-CoV-2 full-length spike glycoprotein (S), which is the target of virus neutralising antibodies. The multi-site trial will include up to 30,000 participants aged 18- 85 years and will assess whether BNT162b2 is effective in preventing COVID-19.

If trials succeed, the companies said they're on track to seek regulatory review as early as October 2020 and plan to supply up to 100 million doses of their vaccine by the end of 2020, and approximately 1.3 billion doses by the end of 2021.

Worldwide, more than 150 COVID-19 vaccine candidates are being developed, with some two dozen prospects already in human trials. The coronavirus pandemic has so far claimed at least 649,577 lives and infected about 16,295,350 people across the world.

<https://www.timesnownews.com/health/article/moderna-covid-19-vaccine-could-be-ready-for-use-by-year-end-pfizer-and-biontech-commence-phase-23-study/628160>



REUTERS

Wed, 29 July 2020

Pfizer-BioNTech begin late-stage study of lead COVID-19 vaccine candidate

By Vishwadha Chander, Carl O'Donnell

German biotech BioNTech and U.S. drugmaker Pfizer Inc said on Monday they would begin a pivotal global study to evaluate their lead COVID-19 vaccine candidate.

If the study is successful, the companies could submit the vaccine for regulatory approval as early as October, putting them on track to supply up to 100 million doses by the end of 2020 and 1.3 billion by the end of 2021.

Patients are each given two doses of the drugmakers' vaccine to help boost immunity, so the first 100 million doses would vaccinate around 50 million people.

The study is expected to include about 120 sites globally and could include up to 30,000 participants. It will include regions heavily impacted by COVID-19.

"The initiation of the Phase 2/3 trial is a major step forward in our progress toward providing a potential vaccine to help fight the ongoing COVID-19 pandemic," said Kathrin Jansen, head of vaccine research and development at Pfizer.

The trial hones in on Pfizer's most promising vaccine candidate, which it calls BNT162b2. Earlier studies filtered out other potential vaccines.

Pfizer has already has an agreement to sell 100 million doses of its vaccine to the U.S. government and give it the option to buy 500 million more. It is in talks with other governments, including the European Union, about similar deals.

Over 150 vaccines are being developed against COVID-19, which has claimed nearly 650,000 lives globally and crippled economies.

The vaccine utilizes chemical messenger RNA to mimic the surface of the coronavirus and teach the immune system to recognize and neutralize it. Although the technology has been around for years, there has never been an approved messenger RNA (mRNA) vaccine.

Moderna Inc also launched an advanced stage trial with 30,000 participants on Monday. Johnson & Johnson is starting clinical trials this week.

<https://in.reuters.com/article/health-coronavirus-pfizer-biontech/pfizer-biontech-begin-late-stage-study-of-lead-covid-19-vaccine-candidate-idINKCN24T078>

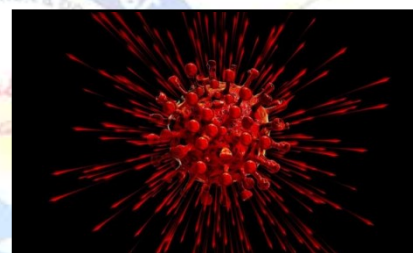


Wed, 29 July 2020

Researchers identify evolutionary origins of SARS-CoV-2

By reconstructing the evolutionary history of SARS-CoV-2, the virus that is responsible for the COVID-19 pandemic, an international research team of Chinese, European, and U.S. scientists has discovered that the lineage that gave rise to the virus has been circulating in bats for decades and likely includes other viruses with the ability to infect humans. The findings, which University of Glasgow scientists contributed to, have implications for the prevention of future pandemics stemming from this lineage.

"Coronaviruses have genetic material that is highly recombinant, meaning different regions of the virus's genome can be derived from multiple sources," said Maciej Boni, associate professor of biology, Penn State. "This has made it difficult to reconstruct SARS-CoV-2's origins. You have to identify all the regions that have been recombining and trace their histories. To do that, we put together a diverse team with expertise in recombination, phylogenetic dating, virus sampling, and molecular and viral evolution."



Credit: Pixabay/CC0 Public Domain

The team used three different bioinformatic approaches to identify and remove the recombinant regions within the SARS-CoV-2 genome. Next, they reconstructed phylogenetic histories for the non-recombinant regions and compared them to each other to see which specific viruses have been involved in recombination events in the past. They were able to reconstruct the evolutionary relationships between SARS-CoV-2 and its closest known bat and pangolin viruses. Their findings appear today in *Nature Microbiology*.

The researchers found that the lineage of viruses to which SARS-CoV-2 belongs diverged from other bat viruses about 40-70 years ago. Importantly, although SARS-CoV-2 is genetically similar (about 96%) to the RaTG13 coronavirus, which was sampled from a *Rhinolophus affinis* horseshoe bat in 2013 in Yunnan province, China, the team found that it diverged from RaTG13 a relatively long time ago, in 1969.

"The ability to estimate divergence times after disentangling recombination histories, which is something we developed in this collaboration, may lead to insights into the origins of many different viral pathogens," said Philippe Lemey, principal investigator in the Department of Evolutionary and Computational Virology, KE Leuven.

The team found that one of the older traits that SARS-CoV-2 shares with its relatives is the receptor-binding domain (RBD) located on the Spike protein, which enables the virus to recognize and bind to receptors on the surfaces of human cells.

"This means that other viruses that are capable of infecting humans are circulating in horseshoe bats in China," said David L. Robertson, professor of computational virology, MRC-University of Glasgow Center for Virus Research.

Will these viruses be capable of jumping directly from bats into humans or will an intermediate species be required to make the leap? According to Robertson, for SARS-CoV-2, other research groups incorrectly proposed that key evolutionary changes occurred in pangolins.

"SARS-CoV-2's RBD sequence has so far only been found in a few pangolin viruses," said Robertson. "Furthermore, the other key feature thought to be instrumental to SARS-CoV-2's ability to infect humans—a polybasic cleavage site insertion in the Spike protein—has not yet been seen in another close bat relative of the SARS-CoV-2 virus. Yet, while it is possible that pangolins may have acted as an intermediate host facilitating transmission of SARS-CoV-2 to humans, no evidence exists to suggest that pangolin infection is a requirement for bat viruses to cross into humans. Instead, our research suggests that SARS-CoV-2 likely evolved the ability to replicate in the upper respiratory tract of both humans and pangolins."

The team concluded that preventing future pandemics will require better sampling within wild bats and the implementation of human disease surveillance systems that are able to identify novel pathogens in humans and respond in real time.

"The key to successful surveillance," said Robertson, "is knowing which viruses to look for and prioritizing those that can readily infect humans. We should have been better prepared for a second SARS virus."

Boni added, "We were too late in responding to the initial SARS-CoV-2 outbreak, but this will not be our last coronavirus pandemic. A much more comprehensive and real-time surveillance system needs to be put in place to catch viruses like this when case numbers are still in the double digits."

More information: Maciej F. Boni et al. Evolutionary origins of the SARS-CoV-2 sarbecovirus lineage responsible for the COVID-19 pandemic, *Nature Microbiology* (2020). DOI: [10.1038/s41564-020-0771-4](https://doi.org/10.1038/s41564-020-0771-4)

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