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समाचार पत्रों से चयित अंश Newspapers Clippings

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Tue, 11 Aug 2020

लार, फूंक या आवाज से भी हो सकेगी कोरोना वायरस की जांच

नई दिल्ली: रक्षा अनुसंधान व विकास संगठन और इजराइल द्वारा संयुक्त रूप से नई तकनीक के जरिये शुरू की गई कोरोना वायरस संक्रमण के जांच का ट्रायल यदि सफल रहा तो आने वाले दिनों में लार, फूंक या आवाज के सैंपल से ही संक्रमण का पता लगाया जा सकेगा। ट्रायल से जुड़े डॉक्टर कहते हैं कि इसका परिणाम सामने आने में करीब एक माह का समय लगेगा। यदि इसमें सफलता मिलती है तो कोरोना की जांच बेहद आसान हो जाएगी और सहूलियत भी होगी।

सफलता मिलने के बाद एयरपोर्ट व रेलवे स्टेशनों पर तो इस तकनीक से यात्रियों की तुरंत कोरोना वायरस संक्रमण की जांच हो सकेगी। ट्रायल के लिए 28 जुलाई से 6 अगस्त तक कैंप लगाकर 10,022 लोगों के सैंपल लिए गए। ये कैंप लेडी हार्डिंग मेडिकल कॉलेज, आरएमएल, लोकनायक अस्पताल, गंगाराम अस्पताल व आकाश अस्पताल में लगाए गए। इसके अलावा डीआरडीओ के लैब में भी कैंप लगाकर सैंपल लिए गए। सबसे अधिक गंगाराम अस्पताल से 3,232 सैंपल लिए गए। अस्पताल में मेडिसिन विभाग के विशेषज्ञ डॉ. अंबुज गर्ग इसके प्रमुख इन्वेस्टिगेटर हैं।

अस्पताल के मेडिसिन विभाग के प्रमुख डॉ. एसपी बयोत्रा ने कहा कि ट्रायल में आरटी-पीसीआर व एंजीजन जांच के अलावा लार का सैंपल लेकर भी जांच की जा रही है। इसके अलावा फेफड़े की जांच के लिए एक ब्रीथ एनालाइजर तैयार किया गया है। इसके माध्यम से फूंक मारकर फेफड़े की जांच की जाती है। इसी तरह यह भी जांच की जा रही है कि आवाज में किस तरह का बदलाव होता है।

डॉक्टर कहते हैं कि लार, आवाज व फूंक मारकर जांच के नतीजे को आरटी-पीसीआर जांच के परिणाम से तुलनात्मक अध्ययन किया जाएगा।

<https://www.aajkijandhara.com/news/Aqr8b/the-corona-virus-can-also-be-detected-by-saliva-blows-or-voice>

तीन अस्पतालों में किया गया शोध, 10 हजार से ज्यादा सैंपल लिए, एक महीने में आएंगे नतीजे

अनुसंधान : सांस से चल जाएगा संक्रमण का पता

नई दिल्ली | वरिष्ठ संवाददाता

लंबे समय तक संक्रमण के खतरे को देखते हुए कोरोना की नई और आसान जांच शुरू करने के लिए दिल्ली में 10,022 लोगों के सैंपल लेकर शोध किया जा रहा है।

शोध का मकसद सांस के जरिए कोरोना की सटीक जांच तैयार करना और आवाज से भी कोरोना के संदिग्धों का पता लगाना है। इजरायल के सहयोग से भारत के रक्षा अनुसंधान एवं विकास संगठन

इन तीन में शोध

- राम मनोहर लोहिया अस्पताल
- लोकनायक अस्पताल
- सर गंगाराम अस्पताल

(डीआरडीओ) द्वारा दिल्ली के तीन अलग-अलग अस्पतालों में मरीजों के सैंपल लेकर यह शोध किया जा रहा है।

6 अगस्त तक 10 हजार से अधिक लोगों के सैंपल लिए गए हैं।

कोरोना अभी लंबे समय तक रहेगा। ऐसे में जांच के लिए ऐसी तकनीक तैयार करनी होगी जिससे सांस के जरिये भी एक मिनट से कम समय में संक्रमण का पता लगा ले। तकनीक विकसित तो हो गई है। अब एक महीने में पता चलेगा कि नतीजे कितने सटीक हैं। - प्रोफेसर एस. पी. बाबोजा, विभागाध्यक्ष, मेडिसिन विभाग, गंगाराम अस्पताल

इनमें सर गंगाराम अस्पताल से सबसे अधिक 3232 लोगों के सैंपल लिए गए हैं। नतीजे एक महीने में जारी होंगे। शोध सफल रहा तो आने वाले समय में सांस के जरिये संक्रमण का 30 सेकंड में पता लग सकेगा। राम

मनोहर लोहिया अस्पताल में शोध से जुड़े वरिष्ठ डॉक्टर देशदीपक ने बताया कि 4 नई तकनीक के बारे में पता लगाया जा रहा है कि ये जांच तकनीक कोरोना का पता लगाने में कितनी सटीक हैं।

 IndianWeb2

Wed, 12 Aug 2020

Maser Technology launches DRDO tech-based ATULYA sterilizer for retail in India to combat COVID 19

ATULYA – a DRDO technology, enables for the first time in the world, sterilization of surface and aerosol up to a depth of 5 meters within 30 seconds Unveiled by Union Cabinet Minister Shri Nitin Gadkari

Maser- the only Indian medical MSME working on microwave technology for disinfection solution has announced the launch of a new product – ATULYA, to enable sterilization of surfaces, surroundings and aerosols during COVID 19 spread. The product was launched by Union Cabinet Minister Shri Nitin Gadkari, Minister for MSME and Road Transport & Highways, in the presence of Dr. Vikas Mahatme, Member of Parliament and Padma Shri Awarded Indian ophthalmologist, Ms. Shivani Dani Wakhre, President – BJYM Nagpur and others at an event in Nagpur with an aim to introduce the technology to masses while people together fight the battle against Coronavirus. ATULYA works on microwave technology to disintegrate virus and bacteria.

ATULYA runs on the technology developed by Defence Institute of Advanced Technology, Pune, deemed university of DRDO. The sterilizer is operated as a handheld device and depending on the shape and size it has the capability to sterilize objects, surfaces, surroundings and aerosols within 30 seconds to 1 minute with a patented smart technology which enables cold sterilization in the range of 56-60 Celsius temperature (MACS^R). The 4.5kg model of the product runs on connected power supply of 5 amp. The company is also working on developing a portable battery version of the same.



“At Maser we are always working on solutions that ensure safety of people through disinfection and sterilization. This ambition led us to associate with DIAT (DRDO) and introduce ATULYA

sterilizer that would enable a safe surrounding for people. The microwave technology of the product can disintegrate viruses and safeguard users during this pandemic. A 30 second simple scan by ATULYA sterilizes any surface upto 5 metres depth, thus eliminating any trace of COVID or similar viruses and bacteria. Prof. K.P. Ray, Dean DIAT (DRDO), is the co-innovator of ‘ATULYA’ and is a world authority on microwave technology. We consider this our responsibility in the current unprecedented times to bring this solution to the masses,” said Monish Bhandari – Founder and Managing Director, Maser Technology.

“It is delightful to see our intelligent Indian minds working on technology backbone and come up with solutions like ATULYA, while we combat COVID 19. This highlights how our Indian MSME’s are taking the vision of ‘Vocal for Local’ a step ahead with every innovation,” said Union Minister Shri Nitin Gadkari.

ATULYA has capability to penetrate up to a depth of 5 meters across surfaces. Unlike UV and chemical based products it is proven to be safe against cancer, retina damage and skin diseases. ATULYA is tested for Covid / virus sterilization by DIAT using the revolutionary Nuclear Magnetic Resonance (NMR) technique. The unit is compliant to NFX French Sterilization Compliance, STAATT II compliant (USA) and is CE and EN13485 certified for international quality standards.

Price & Availability

ATULYA will be available for government purchase on Government e-Market procurement portal (GeM – <https://gem.gov.in/>) and on e-commerce website Amazon (<https://www.amazon.in/>) at an introductory price of INR 12,700/- + taxes.

Parameter	Atulya by Maser MD-1
Power Source	AC 220V, 50Hz, 15A
Magnetron	2.4GHz
Magnetron Wattage	800 W
Magnetron Anode Voltage	4.2 KV
Accessories	AC Cord
Device Weight (kgs)	7.7
Device Dimensions (LxWxH) (cms)	31.0 x 33.4 x 26.7
Packaging Weight (kgs)	10.75
Packaging Dimensions (LxWxH) (cms)	54.2 x 44.2 x 42.5
Introductory Price	Rs 12,700/- + taxes
Availability	Amazon – 7-10 days from order date

About Maser Technology

Maser Technology was established in 2018 with an aim to provide masses with safe environment to thrive in. Maser is the only company that works on Microwave based advance Technology for Disinfection and Sterilization and has 90% of the Indian medical microwave market share. It has been ranked #1 Medical MSME by SIDBI in 2019.

With over 400 years of collective microwave tech experience, the company has entirely focused on its mission to give its best to the society by continuously developing & manufacturing environment friendly products at reasonable rates. In the last 2 years the company has developed 4 disinfection and sterilization products and witnessed a whopping 200% Growth. MaserTech is working on a PAN India level with offices and representation across the world, including U.K, U.S.A, U.A.E, Bangladesh and Sri Lanka. It also has a strong PAN India network of distributors, channels partners and ecommerce.

<https://www.indianweb2.com/2020/08/11/maser-technology-launches-drdo-tech-based-atulya-sterilizer-for-retail-in-india-to-combat-covid-19/>

Maser Technology launches ATULYA steriliser to combat COVID-19

Union Cabinet Minister Shri Nitin Gadkari, Minister for MSME and Road Transport & Highways launched ATULYA, a handheld steriliser from Maser Technology. Based on DRDO technology, the product claims to enable sterilisation of surfaces, surroundings and aerosols during the COVID-19 pandemic.

Maser Technology is an Indian medical MSME working on microwave technology for disinfection solutions.

Also present at the launch was Dr Vikas Mahatme, Member of Parliament and Padma Shri awardee Ophthalmologist, Shivani Dani Wakhre, President – BJYM Nagpur and others.

According to a release, ATULYA runs on technology developed by Defence Institute of Advanced Technology, Pune, deemed university of DRDO. The steriliser is operated as a handheld device and depending on the shape and size it has the capability to sterilise objects, surfaces, surroundings and aerosols within 30 seconds to 1 minute with a patented smart technology which enables cold sterilisation in the range of 56-60 Celsius temperature (MACS^R).

The 4.5 kg model of the product runs on connected power supply of 5 amp. The company is also working on developing a portable battery version of the same.

“At Maser we are always working on solutions that ensure safety of people through disinfection and sterilisation. This ambition led us to associate with DIAT (DRDO) and introduce ATULYA steriliser that would enable a safe surrounding for people. The microwave technology of the product can disintegrate viruses and safeguard users during this pandemic. A 30 second simple scan by ATULYA sterilises any surface upto 5 metres depth, thus eliminating any trace of COVID-19 or similar viruses and bacteria. Prof. K.P. Ray, Dean DIAT (DRDO), is the co-innovator of ‘ATULYA’ and is a world authority on microwave technology. We consider this our responsibility in the current unprecedented times to bring this solution to the masses,” said Monish Bhandari, founder and MD, Maser Technology.

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As per the company, ATULYA is tested for Covid / virus sterilisation by DIAT using the revolutionary Nuclear Magnetic Resonance (NMR) technique. The unit is compliant to NFX French Sterilization Compliance, STAATT II compliant (USA) and is CE and EN13485 certified for international quality standards.

<https://www.expresshealthcare.in/news/maser-technology-launches-atulya-steriliser-to-combat-covid-19/424085/>



(L-R) Member of Parliament Padma Shri awardee Dr Vikas Mahatme, Union Cabinet Minister Shri Nitin Gadkari and President BJYM Nagpur Shivani Dani Wakhre at the launch



Wed, 12 Aug 2020

DRDO to equip Indian Army with Advanced Radars that detect exact Chinese positions near LAC

The Indian Army (IA) is also set to acquire six more Indigenous Swathi Weapon-Locating Radar (WLR). The decision to acquire the Swathi WLR comes at the time of increased border tensions with China

According to sources, the case for acquisition of six Swathi WLR worth over ₹ 400 crores is scheduled to be taken up in a defence ministry meeting today. The WLR is developed by Defence Research and Development Organisation (DRDO) and built by Bharat Electronics Limited.

The purchases of the Swathi WLR will also provide a boost to the Make in India mission of the Indian government. Recently, the Indian government imposed an import embargo on 101 defence equipment in a bid to reduce India's reliance on foreign military equipment and at the same time boost research and development of indigenous military equipment.

The Indian Army has been using the radars for its operations along the Line of Control in Jammu and Kashmir. The system was given for trial to Army in 2018.

According to experts, the tried and tested Swathi WLR will also be a great addition in case of war with China. The Swathi WLR will help the Indian Army to know the exact location of artillery guns fired by China.

The Swathi weapon-locating radars will provide fast, automatic and accurate location of enemy weapons like mortars, shells and rockets in 50-kilometre range. The radar can simultaneously detect multiple projectiles fired from different weapons at different locations.

Swathi Weapon-Locating Radar

A WLR is designed to detect the trajectory of an artillery shell. Using the detected path, one can narrow down on an enemy artillery firebase, and direct return fire to successfully destroy it.

At a given position, the radar can scan for targets in one quadrant, encompassing a 90° sector. The array can electronically scan up to +/-45° from its mean bearing. Additionally, for 360° coverage from a given position, the whole array can be rotated by 135° on either side within 30 seconds to quickly change the scanning sector in response to threats.

The WLR is configured on a wheeled Tatra 8×8 truck platform. The trucks are manufactured by Bharat Earth Movers Limited in India under license. The WLR is designed to operate in a high-density fire environment and has an all-weather capability, high mobility and quick reaction time.

The system is a two-vehicle configuration, with the primary sensor, processors, displays and control unit on a single vehicle, and a separate power vehicle to power the radar. The radar data can also be displayed remotely.

The Radar is designed to operate in harsh environments ranging from -20 to +55°C, in hot and humid conditions, and can be safely stored from -40 to +70°C. It can operate at high altitudes up to 16,000 feet (4,900 m).

Shock and vibration performance and resistance to electromagnetic interference (EMI)/electromagnetic compatibility (EMC) are according to international military standards. The

WLR is designed for quick deployment and decamp, and can be ready for action within 30 minutes. In case of any incoming threats, the radar can be quickly moved out of the threat area.

The WLR has also proved to be popular abroad. In March 2020, India and Armenia signed a deal for the sale of four Swathi (WLR) stations. This deal, worth \$40 million was the first of its kind with Armenia and stands out because vendors from Russia and Poland were also in the running.

<https://eurasianimes.com/drdo-to-equip-indian-army-with-advanced-radars-that-detect-exact-chinese-positions-near-lac/>

BUSINESS INSIDER
INDIA

Tue, 11 Aug 2020

List of weapons that India can make at home — and the ones it cannot

By Prabhjote Gill

- *Hindustan Aeronautics Limited (HAL) and Larsen and Turbo (L&T) have the most to gain from the Indian government's ban on the import of defence items.*
- *The Dhruv multirole helicopter, INS Vikrant aircraft carrier and submarines are something India is already producing at home.*
- *What remains to be seen is if home-grown companies will be able to bridge the gap between the technology they have and what international peers had to offer.*
- *Here's a full list of items that India's defence sector can get from local companies, and what it has had to import from abroad.*

India's import ban on 101 defence items is a boon for the domestic manufacturing industry. Defence Minister Rajnath Singh estimates that contracts worth nearly ₹ 4 lakh will flow towards local companies within the next six to seven years.

There are some big-ticket items that the defence manufacturing industry is already making at home. With the import ban, these companies will now be gearing up to fill the hole left behind by foreign manufacturers.

Even though the ban will play out in a phased manner with a deadline of December 2025, around 69 categories of defence equipment will be off the market for import starting December this year. This includes several types of warships, light transport aircraft, light combat fighter aircraft, light combat helicopters and ground transport vehicles, among other things.

Here's a full list of defence weapons and equipment that India can make at home — and what it needed to import so far:

India can build the Dhruv multirole helicopter, Rudra armed helicopter and Light Combat Helicopter (LCH) in house...

These three choppers are developed by HAL in cooperation with Taneja Aerospace and Aviation Limited (TAAL) indigenously within India.

..But the Apache attack helicopter, Chinook heavy-lift helicopter and the MH-60 Seahawk maritime helicopters are imported.

The AH-64E Apache attack helicopter and the Chinook heavy-lift helicopter are manufactured by the US-based defence mammoth Boeing. The MH-60 Seahawk maritime helicopters are produced in the US by Sikorsky Aircraft.



Mission Shakti, India's anti-satellite weapon designed by the Defence Research and Development Organisation (DRDO) BCCL

In comparison to the fully-equipped Apache and Chinook, Rudra and LCH are “essentially unarmed”. Analysis shows that Rudra and LCH have no precision strike or anti-air capability, even though both these features were planned from the get-go.

India can build the INS Vikrant aircraft carrier at home but the Admiral Grigorovich class stealth frigates but brought in from Russia.

Cochin Shipyard and Millennium Aero Dynamics indigenously developed and produced the INS Vikrant and they’re currently working on INS Vishal, which is currently in the design stage.

The Admiral Grigorovich-class stealth frigates were imported from the Yantar Shipyard in Russia. Something, the government planned to acquire more of going forward.

The Tejas fighter aircraft was developed locally and the Sukhoi 30 MKI fighter aircraft was produced indigenously but the design was procured under license from Russia...

The Tejas fighter aircraft is manufactured in India by HAL and TAAL. The Sukhoi 30 MKI, though also produced by HAL and TAAL, was developed by the Sukhoi Design Bureau in Russia.

Since the import of the Tejas aircraft will be banned after December, the Air Force plans to buy another 123 for around ₹ 85,000 crore before the deadline hits.

..However, the Rafale fighter aircraft, the PC-7 light trainer aircraft, and the Pipistrel Virus Garud ultralight utility aircraft are imported.

The Rafale aircraft, five of which arrived in India late last month, is developed and manufactured by Dassault Aviation in France. The PC-7 light trainer aircraft is imported from Pilatus Aircraft in Switzerland and the Pipistrel Virus Garud ultralight utility aircraft from Pipistrel in Slovenia.

The Arjun main battle tank, Mk I and MK II are made in India but the massive Bhisma T-90 battle tank comes from Russia

The Arjun Battle tank is developed by the Defence Research and Development Organisation (DRDO) and produced in the Heavy Vehicles Factory in Avadi.

The Bhisma T-90, though currently developed and manufactured by Russia in Uralvagonzavod, may shift assembly to Avadi in the near future.

The catch with these tanks is that even though the trials team recommended air conditioning, the Army chose to induct T-90 Main Battle Tanks (MBTs) without it — which can make things messy during an Indian summer.

Israel provides most of India’s drones, but the DRDO has plans of its own

India imports around \$2.7 million worth of defence equipment from Israel. This includes the Syder mobile air defence system as well as Heron and Searcher drones.

In fact, the Indian Air Force used some its Israeli equipment during its raid on the Balakot terrorist training camp in Pakistan last year — including the Heron drones, the Phalcon airborne early warning and control system, SPICE 200 and the Popeye precision-guided munitions.

India, so far, lacks the technological capability to create its own defence drones. However, the DRDO does have plans to develop and produce air-launched drones in collaboration with the Air Force Research Laboratory in the US. It is also working on its very own Nishant unmanned aerial vehicle.

Innovation to fill the missing gaps

An import ban doesn’t mean that India can’t collaborate with foreign countries in order to build up its own defence capabilities. For instance, India’s current research with Japan focuses on technology that can further boost the efficiency of unmanned ground vehicles and robotics.

With the US, India is focusing on lightweight small arms technology and air-launched drones.

At home, HAL and BEL have set up the Defence Innovation Organisation (DIO), which has a Defence Excellence (iDEX) programme.

So far, there have been rounds of the programme, which have led to designs for unmanned ground and underwater vehicles, GPS anti-jam devices, and individual protection systems among other things.

<https://www.businessinsider.in/defense/news/heres-a-full-list-of-weapons-that-indias-defence-sector-can-get-from-local-companies/slidelist/77459796.cms#slideid=77459984>

Defence News

Defence Strategic: National/International

Business Standard

Wed, 12 Aug 2020

MoD go-ahead to 'Make in India' acquisitions worth Rs 8,722 crore

The bulk of this will go towards purchasing the first fixed wing aircraft that Hindustan Aeronautics (HAL) has designed and developed in decades

By Ajai Shukla

New Delhi: In a major fillip to the indigenous aerospace and defence industry, the Ministry of Defence (MoD) on Tuesday approved the acquisition of 'Make in India' equipment worth Rs 8,722 crore.

“The Defence Acquisition Council (DAC), in its meeting held [with] Defence Minister Rajnath Singh, accorded approval for capital acquisitions of various platforms and equipment required by the Indian Armed Forces. Proposals for an approximate cost of Rs 8,722.38 crore were approved,” the MoD announced.

The bulk of this will go towards purchasing the first fixed wing aircraft that Hindustan Aeronautics (HAL) has designed and developed in decades: The Hindustan Turbo Trainer – 40 (HTT-40), on which rookie pilots of the Indian Air Force (IAF) and the navy will learn to fly.

“[With] prototypes and certification process underway, the DAC approved procurement of 106 basic trainer aircraft (BTA) from HAL to address the basic training requirements of the IAF. Post certification, 70 BTA will be initially procured from HAL and balance 36 after operationalisation of HTT-40 fleet in IAF,” stated the MoD.

MoD sources say the HTT-40's cost has been fixed at approximately Rs 50 crore, which means the acquisition cost of the entire fleet will come to about Rs 5,300 crore.

The IAF was pushing for the acquisition of 38 more Pilatus PC-7 Mark II basic trainers from Switzerland, to supplement its existing fleet of 75 aircraft. However, HAL's rapid success in developing the HTT-40 has ensured that the additional BTAs will all be Indian.

HAL sources say the HTT-40 is in the final stages of spin trials, the make-or-break capability demonstration for a basic trainer. Production planning for building the trainer is already underway.



HAL sources say the HTT-40 is in the final stages of spin trials, the make-or-break capability demonstration for a basic trainer. Production planning for building the trainer is underway

The DAC also approved an important procurement the navy needs to improve its warships' capability to strike fast-maneuvring targets like missiles and fast surface crafts at longer ranges.

"The DAC approved procurement of an upgraded version of the Super Rapid Gun Mount (SRGM), which is fitted as the main gun on board navy and Coast Guard warships from Bharat Heavy Electricals," said the MoD.

The DAC also approved the indigenous design and development of armour piercing ammunition for its fleet of T-72 and T-90 main battle tanks. The 125-millimetre armour-piercing fin-stabilised discarding sabot (APFSDS) ammunition has been embargoed for import from December 2021. The MoD says the ammunition being procured will have 70 per cent indigenous content. The DAC also gave the nod for the expedited procurement of Kalashnikov AK-203 assault rifles, which are to be built in India under Russian licence, and, upgrades for Unmanned Aerial Vehicles.

https://www.business-standard.com/article/defence/mod-go-ahead-to-make-in-india-acquisitions-worth-rs-8-722-crore-120081101865_1.html



Wed, 12 Aug 2020

Armed drones, speeding up procurement of AK 203 rifles get a push amid India-China standoff

The defence ministry on Tuesday approved proposals for procuring and upgrading UAVs and also paved the way for speeding up the procurement of AK 203 rifles to be used by the Indian Army

By Abhishek Bhalla

New Delhi: The defence ministry has approved the upgrade of Heron Unmanned Aerial Vehicles (UAVs). The upgrade will include arming some of these drones, sources said.

The decision comes amid the India-China standoff as the Indian military is preparing for enhancing its surveillance capabilities at the Line of Actual Control (LAC).

The Heron UAVs are already being used in the forward areas in Ladakh.

In February this year, during the defence expo in Lucknow, Hindustan Aeronautics Limited (HAL) and Israel Aerospace Industries (IAI) from Israel and Dynnamic Technologies Limited signed an agreement for manufacturing of drones.

The defence ministry on Tuesday approved proposals for procuring and upgrading UAVs and also paved the way for speeding up the procurement of AK 203 rifles to be used by the Indian Army.

The India-Russia joint venture for manufacturing of the AK 203 in Korva, Amethi district of Uttar Pradesh has not made any headway yet.

"Efforts are on to get rid of the bottlenecks and start work at the factory," said a source.

The army is hoping the manufacturing unit will provide 7.5 lakh AK-203 rifles.

To meet the shortfall, the Indian Army has ordered 72,000 Sig Sauer rifles. The Indian Army has been wanting to phase out the INSAS that are over two decades old.

Approval for indigenous equipment worth Rs 8,722 crore

In addition to giving approvals for these two critical projects, the Defence Acquisition Council, headed by Defence Minister Rajnath Singh, on Tuesday also gave the nod to proposals worth Rs 8,722.38 crore to be procured indigenously.

This is in line with India's focus on self-reliance in manufacturing military equipment domestically.

This includes 106 basic trainer aircraft (HTT-40) for the Indian Air Force that will cost over Rs 7,000 crore, sources said.

"To strengthen the Indian Armed Forces by relying on indigenous capability to take forward the initiative on 'Atmanirbhar Bharat', the Defence Acquisition Council in its meeting held under the chairmanship of Defence Minister Rajnath Singh accorded approval for capital acquisitions of various platforms and equipment required by the Indian Armed Forces on Tuesday, the defence ministry said in a statement.

The Hindustan Aeronautics Limited (HAL) has developed the basic trainer aircraft (HTT-40) prototypes and certification process is underway.

"Post-certification, 70 basic trainer aircraft will be initially procured from HAL and balance 36 after operationalisation of HTT-40 fleet in IAF," the ministry said.

To improve the firepower of Indian Navy, the DAC approved procurement of an upgraded version of Super Rapid Gun Mount (SRGM) which is fitted as the main gun on board Navy and Indian Coast Guard (ICG) warships from Bharat Heavy Electricals Limited (BHEL). The upgraded version of SRGM has enhanced capability to perform against fast manoeuvring targets like missiles and Fast Attack Crafts and increase the maximum engagement range.

The DAC also approved procurement of 125 mm APFSDS (Armour Piercing Fin Stabilized Discarding Sabot) ammunition for Indian Army as a 'Design and Development Case'. The ammunition being procured will have a 70 per cent indigenous content.

<https://www.indiatoday.in/india/story/armed-drones-speeding-up-procurement-of-ak-203-rifles-get-a-push-amid-india-china-standoff-1710185-2020-08-11>



Wed, 12 Aug 2020

Rs 42k crore stealth submarine plan to finally kick off

India is now finally getting set to issue the formal tender for the long-pending over Rs 42,000 crore project to make six new-generation stealth submarines domestically with foreign collaboration.

Defence ministry (MoD) sources on Monday said the tender or RFP (request for proposal) "should be issued by next month" to defence shipyard Mazagon Docks (MDL) and private ship-builder L&T for the submarine programme, called Project-75 India (P-75I).



It will be the first project to be launched under the strategic partnership (SP) policy promulgated by the NDA government in May 2017 to boost indigenous production under the overall "Make in India" platform. The submarine or other SP projects will not be impacted by the negative arms import list issued by MoD on Sunday, as was reported by TOI.

The two Indian shipyards or SPs will have to submit their technical and commercial bids in response to the RFP after they tie up with their preferred original equipment manufacturer (OEM) from the five short-listed by the MoD earlier.

The five OEMs are Rubin Design Bureau (Russia), Naval Group-DCNS (France), ThyssenKrupp Marine Systems (Germany), Navantia (Spain) and Daewoo (South Korea).

The Navy, grappling with an ageing and fast-depleting underwater combat arm, hopes to induct the first new submarine seven years after the P-75I contract is finally inked by 2021-2022.

The force currently has only two new Scorpene and 13 old (all commissioned well over 20 years ago) diesel-electric conventional submarines, apart from two nuclear-powered submarines. Four more of the French-origin Scorpene will be delivered by 2022 under the ongoing over Rs 23,000 crore Project-75 at MDL.

But China, which is expanding its naval presence in the Indian Ocean region, already has 50 diesel-electric and 10 nuclear submarines. Pakistan, which has five submarines, in turn will begin inducting eight new Chinese Yuan-class submarines, with air-independent propulsion (AIP) for great underwater endurance, from next year onwards.

India's P-75I for six new submarines, with both land-attack cruise missiles and AIP, was first granted "acceptance of necessity (AoN)" way back in November 2007 but is yet to be finalised.

None of the major six to seven "Make in India" defence projects, collectively worth over Rs 3.5 lakh crore, in fact, have actually taken off in the last six to seven years, as was reported by TOI earlier.

The MoD says P-75I, which can be finalised by December 2021 at the earliest, will bring in key technologies to ensure the next submarine-building project (P-76) is completely indigenous in design and technology.

Under the approved plans, the Navy should get 18 conventional submarines as well as six nuclear-powered attack submarines (called SSNs) and four nuclear-powered submarines with long-range nuclear-tipped missiles (SSBNs) for effective deterrence against China and Pakistan, as earlier reported by TOI.

<https://www.defencenews.in/article/Rs-42k-crore-stealth-submarine-plan-to-finally-kick-off-921957>

THE TIMES OF INDIA

Wed, 12 Aug 2020

OFT's 'stabilized remote-controlled gun' launched

Trichy: The Ordnance Factory of Tiruchirappalli (OFT) has launched an indigenously manufactured weapon named stabilized remote controlled gun (SRCG).

A dedicated assembly and testing facility were also opened for manufacturing the weapon here. Defence minister Rajnath Singh launched the weapon through video-conferencing on Monday as part of Atma Nirbhar Bharat Abhiyan (self-reliant India mission).

OFT officials said the SRCG fitted with 12.7mm M2 NATO standard machine gun, is designed for marine applications.

It will be mounted on warships and patrol boats and can remotely engage small boats, skiff and other small crafts with high accuracy both during day and night.

"Equipped with sensors, the weapon has an automatic target tracking capacity. The gun can be fired manually even in case of malfunction," C Ariya Sakthi, works manager, OFT told TOI.

At an estimated cost of Rs 2.8 crore, the assembly and testing facility produces the weapon for Indian Navy and Coast Guard.

The indigenous manufacturing will save Rs 167 crore, officials said. The new weapon will provide a business opportunity for Rs 255 crore per annum for the next four years to OFT and other sister factories. While the gun will be manufactured in Trichy, a contract is placed by integrated headquarters, ministry of defence on Elbit Systems, Israel for transfer of technology (ToT) for SRCG.

<https://timesofindia.indiatimes.com/city/trichy/ofts-stabilized-remote-controlled-gun-launched/articleshow/77494423.cms>

Govt to focus on reducing use of imported components in indigenously developed platforms

The defence ministry will focus on significantly bringing down percentage of imported components in indigenously developed military platforms and weapons systems like light combat aircraft Tejas and Akash missiles, officials said on Monday. The Indian armed forces have been using a plethora of indigenously developed platforms and weapons which have various imported components and electronic systems.

Defence Minister Rajnath Singh on Sunday announced that India will stop import of 101 military systems and weapons like transport aircraft, light combat helicopters, conventional submarines and cruise missiles by 2024 to promote India's domestic defence industry.

The negative list featured many products which have either been developed by India or are in the development stage.

"Besides aiming to produce key platforms and weapons in India, the government will also focus on bringing down the percentage of imported components in indigenously developed systems," said an official.

On the inclusion of light combat aircraft (LCA Mark 1A) and a number of missile system which are manufactured in India in the negative list, the defence ministry said it was done to ensure that the armed forces do not go for importing similar systems.

The Tejas is a light combat aircraft produced by state-run aerospace behemoth Hindustan Aeronautics Limited NSE -1.95 %. The aircraft has some imported components.

"It is also highlighted that for a product to be considered as an indigenous system, the percentage of indigenous content has to meet minimum laid down specifications," the defence ministry said in a clarification.

"Hence, manufacturers are also required to ensure indigenisation and decrease import content to the permissible limits," it said.

It further said: "It is clarified that the reason for specifying systems presently made in India with part-import content is to ban procurement of such equipment or items which carry similar qualitative requirements but are often contracted under differing nomenclatures."

The decision to prune the import list of weapons systems under a year-wise schedule was first announced by Finance Minister Nirmala Sitharaman in May while rolling out reform measures for the defence manufacturing sector that included increasing the FDI limit from 49 per cent to 74 per cent under the automatic route.

The defence ministry has set a goal of a turnover of USD 25 billion (Rs 1.75 lakh crore) in defence manufacturing in the next five years that included an export target of USD 5 billion (Rs 35,000 crore) worth of military hardware.

<https://www.defencenews.in/article/Govt-to-focus-on-reducing-use-of-imported-components-in-indigenously-developed-platforms-921953>

Prepping for the long haul in Ladakh: The implications of Indian Army's winter deployment at LAC

Though efforts are being made to bridge the trust deficit with the PLA at the border, the Indian military is taking no chances and getting ready for what could be six gruelling winter months in Eastern Ladakh

Key Highlights

- *The disengagement process with China is not moving forward even after several rounds of military level talks; the Chinese troops have not withdrawn from the stretch between Finger-4 and Finger-8 at Pangong Tso*
- *Besides amassing weapons and troops near LAC, China has increased the number of its fast interceptor boats deployed on Pangong Lake*
- *Besides food and kerosene oil, Indian troops would need special tents and shelters and extreme cold conditional (ECC) clothing*

Unless the Chinese Communist Party has a sudden change of heart – or plans – it is now increasingly certain that the Indian military will have to navigate the forbidding winter months of Ladakh in very harsh terrain.

The armed forces are preparing for a long haul in Eastern Ladakh where Chinese troops have transgressed across the Line of Actual Control (LAC), senior military officials have told a parliamentary panel, according to a report in *India Today*.

Though efforts are being made to bridge the trust deficit with the People's Liberation Army (PLA) at the border, the Indian side is taking no chances and getting ready for what could be several gruelling and uncertain winter months in the region, starting October.

The disengagement process with China is not moving forward even after several rounds of military-level talks; the Chinese troops have not withdrawn from the stretch between Finger-4 and Finger-8 at Pangong Tso.

Besides amassing weapons and troops near the LAC, China has increased the number of its fast interceptor boats deployed on Pangong Lake.

Winter starts early in Ladakh

Unlike many other parts of northern India where winters sets in well into November, Ladakh sees the onset of bitter cold from October, and particularly so in the upper reaches of Eastern Ladakh at the border area with China.

This means, the Indian armed forces barely have 50 odd days to get fully prepared for winter. The good news is preparations are well under way, and India's military commanders are taking a holistic look at the entire 3,600-km LAC, extending to Uttarakhand, Sikkim and Arunachal Pradesh.

Winters are long in Ladakh – we are talking about half a year here – and last till the end of March. So the tens of thousands of Indian soldiers posted at the LAC will need not just cutting edge equipment and weapons but also a steady supply of rations.



Representational image

The need of the hour

Thousands of ALS trucks are carrying massive quantities of ration and fuel for the soldiers in Ladakh.

Besides food and kerosene oil, the troops would need special tents and shelters, as well as adequate numbers of extreme cold conditional (ECC) clothing.

The crucial thing to note in all these preparations is that much of the route leading to Ladakh gets snowed-in after October, and therefore most of the supplies will have to be brought to the LAC in advance.

Another item being procured is winter diesel, a fuel that specifically caters to low-temperature and high altitude regions like Ladakh.

The math which is done for the requirements also takes into account reserve stocks.

The troop build-up is not aimed just at thwarting Chinese mischief during winter, but also to prevent any further incursions once the snows melt in April next year. Following the clash at Galwan valley in June – in which 20 Indian soldiers and an unknown number of PLA troops were killed – India's military brass is preparing for all eventualities even as talks between the two militaries continue.

<https://www.timesnownews.com/india/article/prepping-for-the-long-haul-in-ladakh-the-implications-of-indian-army-s-winter-deployment-at-lac/635501>



Wed, 12 Aug 2020

Indian Army ready for a long haul in Ladakh, says CDS Rawat

The military brass led by CDS Rawat briefed the parliamentary panel on the current status, confirming that the de-escalation process might take time

By Mayank Singh

New Delhi: Confirming the Chinese design of keeping the tensions alive along the Line of Actual Control in Eastern Ladakh, Chief of Defence Staff (CDS) General Bipin Rawat has told a parliamentary panel that Army is prepared for a long haul.

The military brass led by CDS Rawat briefed the parliamentary panel on the current status, confirming that the de-escalation process might take time. A senior officer said the stand-off is getting stretched as the Chinese are waiting for an opportune moment. "The Chinese side is not fulfilling disengagement agreements as they have done massive mobilisation of troops. However, that has not led to any major gain which they can project among their people. Hence, they are causing this impasse," the officer told this newspaper.

The CDS told the panel that the troops are deployed in commensurate strength along with armoured, artillery and missile launchers to thwart any imminent design of the PLA. The briefing came when the top military commanders appeared before the PAC on the issue of procurement of high-altitude clothing for the troops.

The Defence Acquisition Council accorded approval for capital acquisitions of amounting of ₹8,722.38 crore. The procurements approved included 106 Basic Trainer Aircraft from HAL for the IAF, an upgraded version of Super Rapid Gun Mount from BHEL for the Navy and 125 mm Armour Piercing Fin Stabilized Discarding Sabot ammunition for the Army.

<https://www.newindianexpress.com/nation/2020/aug/12/indian-army-ready-for-a-long-haul-in-ladakh-says-cds-rawat-2182288.html>

India's new Rafales carry out night sorties: Combat experience of the French-made jet gives it a critical edge

The period between 2006 and 2011 saw the Rafale emerge as a trusted, high-proficiency aircraft, time after time demonstrating its value as a key military asset capable of assimilating a variety of weapons

Key Highlights

- *One area where the Rafale stands head and shoulders above its Chinese counterpart is in combat experience*
- *The Rafale's first taste of operational experience came in March 2007 when a fleet was sent into Afghanistan to assist Dutch troops in the conflict-ridden nation*
- *The jets were also involved in the French military intervention operations in support of the Mali government in 2013, as well as in 2014 in Iraq and Syria*

The five brand new Omni-role Rafale jets recently inducted into the Indian Air Force have been conducting day and night sorties in various terrains, including near the mountains of Himachal Pradesh, as they inch closer and closer to full operational capability. The jets that landed in Ambala on July 29 are the first batch of 36 that India had inked a Rs 58,000 crore deal with France to acquire as far back as 2016.

Since their arrival, and against the backdrop of heightened tensions between India and China at the border in Easter Ladakh, comparisons between the Dassault-made aircraft and China's J-20 fighter have been inevitable and abundant. However, the reality is that the two aircraft have never been involved in an aerial engagement before so whatever conclusion one may draw, ultimately, involves a fair deal of speculation.

But one area where the Rafale stands head and shoulders above its Chinese counterpart is in combat experience. For all that has been written and said of the fifth generation Chengdu J-20, the inescapable fact remains that it has never been tested in a real mission. The Rafale, on the other hand, has over 30,000 hours of experience participating in a vast range of missions since 2006.

The Rafale in combat

Developed by Dassault Aviation, the Rafale aircraft became part of the French Navy in late 2000. However, its first taste of operational experience came in March 2007 when a fleet was sent into Afghanistan to assist Dutch troops in the conflict-ridden nation.

The Rafales were tasked with deploying GBU-12 (250kg, laser-guided) bombs in Southern Afghanistan as part of the International Security Assistance Force (SAF). Between 2009 and 2011, three Rafale jets remained stationed at Kandahar Airport to undertake a series of combat missions supporting NATO ground personnel.

The period between 2006 and 2011 saw the Rafale emerge as a trusted, high-proficiency aircraft, time after time demonstrating its value as a key military asset capable of assimilating a variety of weapons and striking targets with great precision.

The next time the Rafales saw action was in 2011 when the French Air Force deployed these aircraft to assist coalition forces during the Libyan Civil War that led to the overthrow of the Muammar Gaddafi-led government.



The first batch of Rafale jets arrived in Ambala on July 29. | Photo Credit: PTI

The jets were the first to enter the high-conflict cities of Benghazi and Tripoli where they showcased their versatility, conducting a slew of different operations with varied mission parameters, employing laser-guided bombs, HAMMERS and SCALP cruise missiles, razing several high-value, dangerous targets like command centres, air-defence systems, tanks, armoured vehicles and artillery systems to the ground.

But those aren't the only times where the Rafale's aerial superiority and threat have been on display. The jets were also involved in the French military intervention operations in support of the Mali government in 2013, as well as in 2014 in Iraq and Syria contributing to the international military effort against the Islamic State (ISIS).

Since being inducted into the French Air Force, not a single Rafale jet has been shot down, having going under the radar of enemy forces on countless occasions.

<https://www.timesnownews.com/india/article/indias-new-rafales-carry-out-night-sorties-combat-experience-of-the-french-made-jet-gives-it-a-critical-edge/635454>

THE ECONOMIC TIMES

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Indian Air Force's Rafales are practicing aerial maneuvers to take on China and Pakistan

Perfect practice

The five new Rafale omni-role fighter jets are now undertaking day and night practice sorties in different terrains, including the mountainous one in Himachal Pradesh, ahead of their formal induction ceremony at the Ambala air base towards the end of this month, reports TNN.

Trouble for the Chinese

Sources said the five Rafales, which will take a couple of months to become fully operational after having touched down at Ambala on July 29, are likely to carry out "similar training sorties" in Ladakh in the near future. The twin-engine fighters, however, can be combat deployed if required in an emergency during the ongoing military confrontation with China.



Best among equals

All the 36 Rafales, under the Rs 59,000 crore deal inked with France in September 2016, will be delivered by end-2021. Armed with their 'Meteor' air-to-air missiles (120-150 km strike range), 'Scalp' air-to-ground cruise missiles (over 300 km) and other armaments, they will be able to outgun their Pakistani and Chinese rivals like F-16s, JF-17s and J-20s.

Saving the best for the last

But the IAF is in no hurry to operationally deploy them as of now. An "adequate number" of frontline Sukhoi-30MKI, Mirage-2000, MiG-29 and other fighters as well as Chinook heavy-lift and Apache attack helicopters are already positioned in Ladakh as well as other stretches along the 3,488-km Line of Actual Control to cater for any contingency, said sources.

Twin sanctuaries

The Ambala and Hasimara air bases are slated to house 18 Rafales each for the western and eastern fronts. IAF has also projected the operational need to go in for another 36 Rafales.

<https://economictimes.indiatimes.com/news/defence/indian-air-forces-rafales-are-practicing-aerial-maneuvers-to-take-on-china-and-pakistan/twin-sanctuaries/slideshow/77480630.cms>

Rafale not enough? Pak, China have more ‘force multipliers’ than IAF, says report

The limited number of Rafales ordered is "a bow to fiscal realities"

As the Indian Air Force continues to work up its first five Dassault Rafale fighters, a US media article has warned the deal for the 36 French fighters won't change the "hard reality that, as an air power, India is falling far behind".

Two Indian experts, Harsh V. Pant and Angad Singh, authored the article on *Foreign Policy*, which was published on Monday. Pant is director of research at the Observer Research Foundation think tank while Angad Singh is a project coordinator at the same institution.

Angad and Pant wrote in *Foreign Policy* that the deal for 36 Rafale jets will go "some way toward" filling the Indian Air Force's larger requirement of 126 fighter jets. The requirement for 126 jets was first mooted after the Kargil War in 1999. The Rafale was selected as the preferred bidder for a deal for 126 jets in 2012, but a contract could not be finalised. In 2015, the Narendra Modi government cancelled the tender as it announced its plan to buy 36 Rafale jets.



A Saab 2000 Erieye in Pakistan Air Force markings | Pakistan Air Force

"The Indian Air Force has historically been one of the best-equipped air forces in the region, but it has seen its advantage, both qualitative and quantitative, against China and Pakistan narrow dramatically over the past two decades. Even worse, it now faces the challenge of mustering enough aircraft to tackle any possible collusion between the Pakistani and Chinese air forces," Angad and Pant write in *Foreign Policy*. They noted China appeared to be increasing deployments to airfields in Tibet, while Pakistan had conducted exercises at its airbase at Skardu in Pakistan-occupied Kashmir.

The *Foreign Policy* article acknowledges the Rafale "finally provides the Indian Air Force with a comprehensive combat craft that requires very little further tinkering", but adds the limited order number is "a bow to fiscal realities". *Foreign Policy* cites the fall in squadron numbers in the Indian Air Force, which is expected to reach 30 squadrons by 2025, against a government-approved strength of 42 squadrons.

"No matter how advanced the Rafale or how effective its long-range weaponry, the addition of 36 jets will not dramatically alter the balance of power in the region," the *Foreign Policy* article argues. The authors support this argument by noting China's Western Theatre Command has deployed around 200 fighter jets on its border with India, while Pakistan has "350 fighters it can put up against India". *Foreign Policy* notes while China is hampered by lack of bases close to the border with India, "Pakistan has few operating restrictions relating to bases and aircraft performance". The *Foreign Policy* analysis notes "Taken together, as all worst-case Indian military planning scenarios do, the Pakistani and Chinese air forces far outnumber India's and will continue to do so for the foreseeable future".

Angad and Pant also point to Pakistan and China having more aerial refuelling tankers and airborne early-warning aircraft than the Indian Air Force. "These so-called force multipliers dramatically increase the combat effectiveness of tactical fighters by extending their range or endurance and improving situational awareness in the aerial battlespace," *Foreign Policy* notes.

Tankers and eyes in the skies

While China operates at least two different indigenous airborne early-warning systems, Pakistan uses a Chinese platform mounted on the Shaanxi Y-8 aircraft and also a Swedish system called the Erieye, mounted on the Saab-2000 aircraft. According to reports, in 2019, Pakistan had three Saab-2000 and four Shanxi Y-8 platforms. In comparison at the same time, the Indian Air Force had three PHALCON systems from Israel, mounted on the Russian IL-76 aircraft, and two indigenously built Netra systems mounted on Embraer aircraft from Brazil. In 2018, US publication *Defence News* reported China had inducted around 15 airborne early-warning systems, split across two designs, since the mid-2000s.

The Indian Air Force had been seeking to buy two more PHALCON systems in a deal worth \$2 billion. In addition, the Indian Air Force has been looking to develop a variant of the Netra mounted on the Airbus A330 aircraft, which would offer more endurance, power-generating capacity and operating altitude than the current Embraer aircraft.

Similarly, the Indian Air Force has not been able to complement its fleet of six Russian-supplied Il-78 aerial refuelling tankers. It had twice selected a A330-based tanker design in the past decade, but both contracts failed to materialise.

A report by US think tank RAND in 2018 estimated China had 12 H-6U aerial refuelling aircraft. The H-6U is based on the H-6 bomber and carries lesser fuel than the Il-78. China also acquired three Il-78 tankers from Ukraine.

The Pakistan Air Force is estimated to have four Il-78 tanker aircraft, acquired from Ukraine.

<https://www.theweek.in/news/india/2020/08/11/rafale-not-enough-pak-china-have-more-force-multipliers-than-iaf-says-report.html>

hindustantimes

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Russia continues work on Kudankulam nuclear plant, training Indian pilots for manned spaceflight

Atomash, part of the mechanical engineering division of the Rosatom State Atomic Energy Corporation, announced on Tuesday it had begun manufacturing a set of steam generators for the fifth power unit of the Kudankulam plant

By Rezaul H Laskar

New Delhi: Russia has continued work on key bilateral projects with India amid disruptions caused by the Covid-19 crisis, delivering important components for the Kudankulam nuclear power plant and training Indian pilots for the Gaganyaan manned space mission.

Atomash, part of the mechanical engineering division of the Rosatom State Atomic Energy Corporation, announced on Tuesday it had begun manufacturing a set of steam generators for the fifth power unit of the Kudankulam plant.

So far, Atomash has manufactured and shipped two sets of steam generators for the third and fourth units of the Kudankulam plant. Each reactor requires four generators, which are built to high safety standards and have a heat exchange surface with 11,000 stainless pipes.



A policeman walks on a beach near Kudankulam nuclear power project in Tamil Nadu.(File photo: Reuters)

Russia is building the 6,000-MW project at the site in Tamil Nadu, which will have six VVER-1000 nuclear reactors, and it is in talks with India to construct six more at a new site that is yet to be identified. Two reactors at Kudankulam are currently operational and two more are being built. India signed a framework agreement with Rosatom for constructing the fifth and sixth units in 2017.

Rosatom said Indian contractor Larsen & Toubro, with the technical support of Russian experts, had completed installing the dry shielding for the reactor pressure vessel of the third unit according to schedule. This shielding prevents overheating of the reinforced concrete reactor pit structure, it added.

Earlier this month, the mechanical engineering division of Rosatom began shipping crucial components for the main coolant pipeline for the fourth unit at Kudankulam. This equipment, weighing almost 350 tonnes, will be transported from Petrozavodsk to St Petersburg port, from where it will be carried by a ship about 10,000 km to Kudankulam.

“We have completed the supply of equipment for the four units of the nuclear power plant in India. This year, [shipment] dates were postponed due to restrictions caused by the epidemiological situation. Despite this difficult situation, the [products were] successfully shipped and all contractual obligations to the customer were fulfilled,” said senior Rosatom official Rovshan Abbasov.

“In the context of the restrictions imposed in Russia and India, Rosatom State Corporation Engineering Division, the Indian customer, Russian manufacturers, [and] the port of St Petersburg have kept on working, meeting all the measures prescribed, on the construction of the second phase of Kudankulam nuclear power plant,” said Vladimir Angelov, the director of projects in India.

Meanwhile, the four Indian Air Force (IAF) pilots being trained at the Gagarin Cosmonaut Training Center (GCTC) are scheduled to complete their training in the first quarter of 2021, Roscosmos, Russia’s space agency, announced recently. The contract for their training was signed in June 2019 and they began the course on February 10.

The training includes a number of courses on medical and physical issues, learning Russian, and studying the configuration and systems of the Soyuz manned spacecraft. The health status of the pilots is monitored daily, and professional GCTC doctors conduct a thorough medical examination once every three months.

So far, the Indian pilots have completed training for a possible abnormal descent module landing in wooded and marshy areas during winter, on the water surface, and in the steppes in summer. In June, the pilots passed training in short-term weightlessness aboard an Il-76MDK special laboratory aircraft.

They will also be trained in a hyperbaric chamber to prepare for factors such as G-force, hypoxia and pressure drop during a spaceflight. “The GCTC instructors praise the effort and high motivation of the Indian cosmonauts,” Roscosmos said.

Earlier this year, the Indian pilots had gone into self-isolation purely as a precautionary measure following the detection of Covid-19 cases within the Russian space agency.

<https://www.hindustantimes.com/india-news/russia-continues-work-on-kudankulam-nuclear-plant-training-indian-pilots-for-manned-spaceflight/story-6I457MHHSYKlwsUn6qpwwK.html>



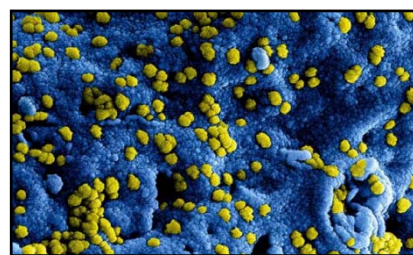
Wed, 12 Aug 2020

For bacteria, a small genome means some serious decluttering—even in the ribosome

Researchers from Skoltech, Lomonosov Moscow State University and the Kharkevich Institute for Information Transmission Problems have studied the genomes of some 200 strains of bacteria to determine which proteins in the ribosome, part of the key cell machinery, can be safely lost and why. The paper was published in the journal *Molecular Biology and Evolution*.

The ribosome is a universal cellular machine, present in all eukaryotes and prokaryotes, that builds proteins in a process called translation. The two major components of the ribosome, the so-called small and large ribosomal subunits, consist of ribosomal RNA (rRNA) molecules and ribosomal proteins.

The composition of these fundamental "protein factories" is fairly consistent across cells, but there is evidence that some bacteria function without a complete set of ribosomal proteins, so researchers have been looking to determine which of the proteins are truly essential for a working ribosome.



Credit: Unsplash/CC0 Public Domain

Skoltech professor and vice president for biomedical research Mikhail Gelfand and his colleagues analyzed ribosomal protein composition in 214 relatively small bacterial genomes. They identified a set of frequently lost proteins and showed that only nine ribosomal proteins were completely conserved, while each of the remaining 48 were lost in at least one strain from the dataset.

"Tiny genomes are characteristic of endosymbionts, bacteria that live within other bacteria or eukaryotic cells. In this non-changing environment and under weak selection they tend to lose non-essential (even if necessary for free-living bacteria) genes—similar to multicellular parasites that often miss entire organs. The ribosome has been assumed to be the most conserved organelle with a standard set of proteins; but if you have only 121 genes—the present bacterial record for simplicity—you cannot encode all fifty-something ribosomal proteins, so some of them have to be lost. We have demonstrated that the patterns of this loss are not random," Professor Gelfand says.

Apparently, ribosomal proteins of the small subunit were more likely to be retained than the large subunit proteins, and most frequently lost proteins were located on the ribosome surface, where they formed fewer contacts with other ribosome components. They were also incorporated in the ribosome late in evolution, so it seems that bacteria tend to practice the "last in, first out" approach when it comes to dropping ribosomal proteins.

The researchers also found that the three bacteria with the shortest genomes in the group lost the largest number of proteins; there was a correlation between genome size and number of retained ribosomal proteins. Yet since ribosomal proteins are in the cell's essential toolkit, they are generally among the last to leave a downsizing bacterial genome.

More information: Daria D Nikolaeva et al. Simplification of ribosomes in bacteria with tiny genomes, *Molecular Biology and Evolution* (2020). DOI: [10.1093/molbev/msaa184](https://doi.org/10.1093/molbev/msaa184)

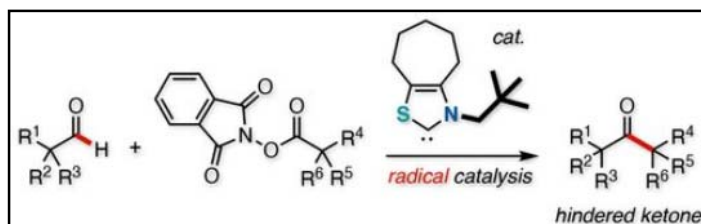
Journal information: [Molecular Biology and Evolution](https://phys.org/news/2020-08-bacteria-small-genome-declutteringeven-ribosome.html)
<https://phys.org/news/2020-08-bacteria-small-genome-declutteringeven-ribosome.html>

Organocatalyst that controls radical reactions for complex and bulky compound synthesis

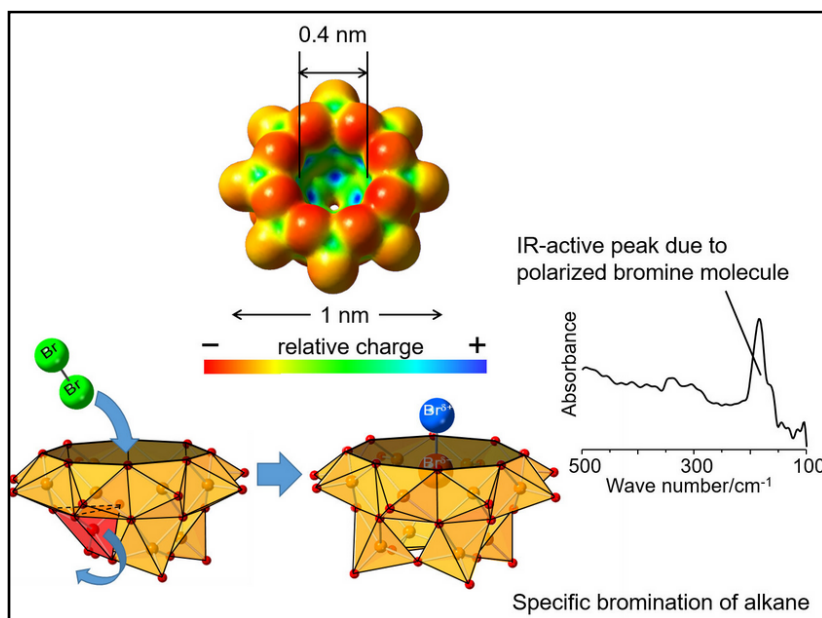
Organocatalysts consisting of organic compounds without metal elements are receiving much attention as next generation catalysts in the hope of reducing environmental burden and coping with exhaustion/rising prices of rare metals. However, it is difficult for an organocatalyst to control radical reactions involving a single electron with high reactivity. Thus, reaction processes mediated by organocatalysts are rather limited. This hinders the development and application of organic synthesis by the use of organocatalysts.

N-heterocyclic carbene is known as an organocatalyst free of metal elements and its catalytic reactions have been actively investigated. Studies on N-heterocyclic carbene as an organocatalyst started with the investigation of a biological reaction involving the coenzyme, thiamine (vitamin B1), a thiazolium salt. The enol intermediate of the biological reaction is known to promote reactions of single electron transfer to electron acceptors such as lipoamide, flavin adenine dinucleotide (FAD) and Fe_4S_4 , which play important roles in oxidation reactions. Scientists were inspired by this biological phenomenon and have synthesized N-heterocyclic carbene catalysts that could control radical reactions. These have been applied to organic synthesis. However, due to limits in the number of substrates that can be used for such a catalytic reaction, only a narrow range of organic compounds could be synthesized. This has severely limited applications, for example, in drug discovery.

Prof. Ohmiya and co-workers designed an N-heterocyclic carbene catalyst in a rational and precise manner for the purpose of widening the range of target chemical substances for radical reactions. The group recently found a thiazolium-type N-heterocyclic carbene catalyst having an N-neopentyl group and applied this carbene catalyst to a radical reaction to synthesize a dialkyl ketone from an aliphatic aldehyde and an aliphatic carboxylic acid derivative. This was previously a very difficult synthesis. So far, a radical reaction using conventional N-heterocyclic carbene catalysts could be applied only to aromatic aldehydes as catalytic reaction substrates. The N-heterocyclic carbene catalyst newly developed



Credit: ACS Catalysis



In catalytic reactions with organocatalysts, it is difficult to control radical reactions. We designed a thiazolium-type N-heterocyclic carbene catalyst having an N-neopentyl group. This catalyst was found to actively control radical reactions and enabled production of more than 35 species of bulky dialkyl ketones from an aliphatic aldehyde and an aliphatic carboxylic acid derivative through a radical relay mechanism. This catalyst is expected to open the way for acceleration of drug discovery research. Credit: Kanazawa University

here is a versatile catalyst applicable to both aromatic and aliphatic aldehydes, thus significantly widening the application of radical reactions of organocatalysts.

The key to this success was their finding that the N-neopentyl group of the thiazolium-type N-heterocyclic carbene was effective in the reaction progress, while their study was carried out making full use of organic chemistry and measurement techniques. The bulkiness of the N-neopentyl group was found to be effective not only in promoting a coupling reaction of two different radical species generated in the reaction system but also in suppressing undesirable side reactions.

The present catalytic reaction has the following merits in organic chemical synthesis; 1) bulky molecules can be reaction substrates due to involvement of a highly reactive radical, and 2) the method is excellent in terms of a wide range of functional groups and substrates, since the catalytic reaction can be carried out under mild conditions without the need for metal catalysts or redox reagents. Thus, it is now possible to synthesize more than 35 bulky and complex dialkyl ketones, which was previously very difficult. This enables the synthesis of natural compounds and pharmaceuticals having a dialkyl ketone backbone from an aliphatic aldehyde and an aliphatic carboxylic acid derivative.

In this study, the research group has designed a new organocatalyst that controls radical reactions, which significantly widens the applicability to various substrates. The study is expected to accelerate drug discovery, since it enables synthesis of organic compounds with high added value that used to be nearly impossible to attain. From an academic viewpoint, the study has established design guidelines of organocatalysts that can control radical reactions.

More information: Yuki Kakeno et al, Direct Synthesis of Dialkyl Ketones from Aliphatic Aldehydes through Radical N-Heterocyclic Carbene Catalysis, *ACS Catalysis* (2020). DOI: [10.1021/acscatal.0c02849](https://doi.org/10.1021/acscatal.0c02849)

Journal information: *ACS Catalysis*
<https://phys.org/news/2020-08-organocatalyst-radical-reactions-complex-bulky.html>



Wed, 12 Aug 2020

Scientists create compact particle accelerators that drive electron beams nearer speed of light

By Ben Robinson

Scientists have successfully developed a pocket-sized particle accelerator capable of projecting ultra-short electron beams with laser light at more than 99.99% of the speed of light.

To achieve this result, the researchers have had to slow down light to match the speed of the electrons using a specially designed metallic structure lined with quartz layers thinner than a human hair.

This huge leap forward simultaneously offers the ability to both measure and manipulate particle bunches on time scales of less than 10 femtoseconds (0.000 000 000 000 01 seconds, or the time it takes light to travel 1/100th of a millimeter). This will enable them to create strobe photographs of atomic motion.



Credit: University of Manchester

This successful demonstration paves the way to the development of high-energy, high-charge, high-quality Terahertz (THz) driven accelerators, which promise to be cheaper and more compact. Reducing the size and cost of accelerator technology, will open up these incredible machines to a much wider range of applications.

Particle accelerators are widespread with applications in basic research in particle physics, materials characterisation, radiotherapy in hospitals, where they are used to treat cancer patients, radioisotope production for medical imaging, and security screening of cargo. The basic technology (radio-frequency oscillators) underpinning these machines however, was developed for radar during the Second World War.

In new research published today in *Nature Photonics*, a collaborative team of academics show that their unique solution is to use lasers to generate terahertz frequency pulses of light. Terahertz is a region of the electromagnetic spectrum between infrared (used in TV remotes) and microwave (used in microwave ovens). Laser-generated THz radiation exists in the ideal millimeter-scale wavelength regime, making structure fabrication simpler but most importantly providing the half-cycle lengths that are well suited for acceleration of whole electron bunches with high levels of charge.

Lead author on the paper Dr. Morgan Hibberd from The University of Manchester said: "The main challenge was matching the velocity of the accelerating THz field to the almost speed-of-light electron beam velocity, while also preventing the inherently lower velocity of the THz pulse envelope propagating through our accelerating structure from significantly degrading the length over which the driving field and electrons interact."

"We overcame this problem by developing a unique THz source which produced longer pulses containing only a narrow range of frequencies, significantly enhancing the interaction. Our next milestone is to demonstrate even higher energy gains while maintaining beam quality. We anticipate this will be realized through refinements to increase our THz source energy, which are already underway."

Professor Steven Jamison of Lancaster University who jointly leads the program, explained: "The controlled acceleration of relativistic beams with terahertz frequency laser-like pulses is a milestone in development of a new approach to particle accelerators. In using electromagnetic frequencies over one hundred times higher than in conventional particle accelerators, a revolutionary advance in the control of the particle beams at femtosecond time scales becomes possible."

"With our demonstration of terahertz acceleration of particles traveling at 99.99% of the speed of light, we have confirmed a route to scaling terahertz acceleration to highly relativistic energies."

While the researchers have an eye to a long term role of their concepts in replacing multi-kilometer scale research accelerators (such as Europe's 3 km long X-ray-source in Hamburg) with devices mere meters in length, they expect the immediate impacts will be in the fields of radiotherapy and in materials characterisation.

Dr. Darren Graham, Senior Lecturer in Physics at The University of Manchester said: "Achieving this milestone would not have been possible without the unique collaborative environment provided by the Cockcroft Institute, which has helped bring together scientists and engineers from University of Lancaster, The University of Manchester and the staff from STFC at Daresbury Laboratory."

More information: Morgan T. Hibberd et al. Acceleration of relativistic beams using laser-generated terahertz pulses, *Nature Photonics* (2020). DOI: [10.1038/s41566-020-0674-1](https://doi.org/10.1038/s41566-020-0674-1)

Journal information: [Nature Photonics](https://phys.org/news/2020-08-scientists-compact-particle-electron-nearer.html)
<https://phys.org/news/2020-08-scientists-compact-particle-electron-nearer.html>

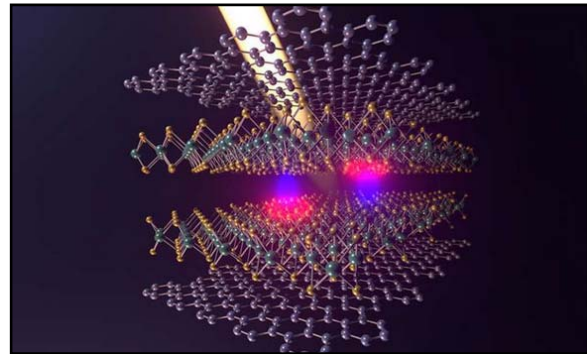
A highly light-absorbent and tunable material

By layering different two-dimensional materials, physicists at the University of Basel have created a novel structure with the ability to absorb almost all light of a selected wavelength. The achievement relies on a double layer of molybdenum disulfide. The new structure's particular properties make it a candidate for applications in optical components or as a source of individual photons, which play a key role in quantum research. The results were published in the scientific journal *Nature Nanotechnology*.

Novel two-dimensional materials are currently a hot research topic around the world. Of special interest are van der Waals heterostructures, which are made up of individual layers of different materials held together by van der Waals forces. The interactions between the different layers can give the resulting material entirely new properties.

Double layer unlocks crucial properties

There are already van der Waals heterostructures that absorb up to 100 percent of light. Single-layers of molybdenum disulfide offer absorption capacities in this range. When light is absorbed, an electron vacates its original position in the valence band, leaving behind a positively charged hole. The electron moves to a higher energy level, known as the conduction band, where it can move freely.



Schematic illustration of the electron-hole pairs (electron: pink, hole: blue), which are formed by absorption of light in the two-layer molybdenum disulfide layer. Credit: Nadine Leisgang and Lorenzo Ceccarelli, Department of Physics, University of Basel

The resulting hole and the electron are attracted to each other in accordance with Coulomb's law, giving rise to bound electron-hole pairs that remain stable at room temperature. However, with single-layer molybdenum disulfide there is no way to control which light wavelengths are absorbed. "It is only when a second layer of molybdenum disulfide is added that we get tunability, an essential property for application purposes," explains Professor Richard Warburton of the University of Basel's Department of Physics and Swiss Nanoscience Institute.

Absorption and tunability

Working in close collaboration with researchers in France, Warburton and his team have succeeded in creating such a structure. The physicists used a double layer of molybdenum disulfide sandwiched between an insulator and the electrical conductor graphene on each side.

"If we apply a voltage to the outer graphene layers, this generates an electric field that affects the absorption properties of the two molybdenum disulfide layers," explains Nadine Leisgang, a doctoral student in Warburton's team and lead author of the study. "By adjusting the voltage applied, we can select the wavelengths at which the electron-hole pairs are formed in these layers."

Richard Warburton adds, "This research could pave the way for a new approach to developing optoelectronic devices such as modulators." Modulators are used to selectively change a signal's amplitude. Another potential application is generating individual photons, with important implications for quantum technology.

More information: Nadine Leisgang et al. Giant Stark splitting of an exciton in bilayer MoS₂, *Nature Nanotechnology* (2020). DOI: [10.1038/s41565-020-0750-1](https://doi.org/10.1038/s41565-020-0750-1)

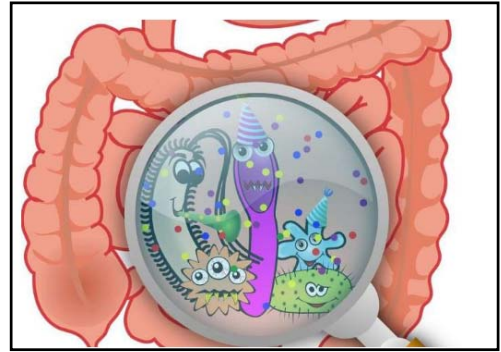
Journal information: *Nature Nanotechnology*

<https://phys.org/news/2020-08-highly-light-absorbent-tunable-material.html>

Enzyme discovered in the gut could lead to new disease biomarker

Enzymes used by bacteria to break down mucus in the gut could provide a useful biomarker for intestinal diseases, according to new research published in *Nature Communications*.

Researchers at the University of Birmingham and Newcastle University have successfully identified and characterized one of the key enzymes involved in this process. They demonstrated how the enzyme enables bacteria to break down and feed off sugars in the layers of mucus lining the gut.



Credit: CC0 Public Domain

The research offers a significant step forward in our understanding of the complex co-dependent relationships at work in the gut, about which little is currently known. Because the mechanism used by the enzyme is particularly distinctive, the researchers anticipate it can be used in the development of new diagnostics for intestinal diseases.

The molecules in mucus, called mucin, are constantly produced by the body to generate the layer of mucus in the gut that provides a barrier between the gut's complex populations of bacteria and the rest of the body. Mucin contain chains of sugar molecules called glycans, and these also provide an essential source of nutrients for bacteria.

The team investigated how this enzyme sits on the outside of the bacterial cell and clips away parts of the mucin molecule, taking them inside the bacterial cell to be consumed.

Because glycans are known to change when certain diseases are present in the body, the researchers anticipate it will be possible to use the enzymes to take a snapshot of the glycans within a biopsys and use that as a biomarker for early detection of the disease.

Lead researcher, Dr. Lucy Crouch, of the University of Birmingham's School of Biosciences, explains: "Mucus is structured a bit like a tree, with lots of different branches and leaves. Lots of the enzymes discovered so far might clip away some of the leaves to eat, but the enzyme we studied will clip away a whole branch—that's quite a distinctive mechanism and it gives us a useful biomarker for studying disease."

The team have investigated this process in three different diseases. They examined tissue from adults suffering from ulcerative colitis and colorectal cancer, and from preterm infants with necrotising enterocolitis, a serious illness in which the gut becomes inflamed and can start to die. They found that by adding the enzyme to the samples and labelling the glycans with a fluorescent dye, they were able to get useful information about the glycan structure.

Dr. Crouch adds: "Although we still don't fully understand what the glycan structures are made from and how these vary between different tissue types, we can see that the differences in structure between health and non-healthy tissue is quite distinctive. We hope to be able to use these enzymes to start producing better diagnostics for the very early stages of these diseases."

More information: Crouch et al (2020). 'Prominent members of the human gut microbiota express endo-acting O-1 glycanases to initiate mucin breakdown'. *Nature Communications*. DOI: [10.1038/s41467-020-17847-5](https://doi.org/10.1038/s41467-020-17847-5)

Journal information: [Nature Communications](https://phys.org/news/2020-08-enzyme-gut-disease-biomarker.html)
<https://phys.org/news/2020-08-enzyme-gut-disease-biomarker.html>



Wed, 12 Aug 2020

Understanding the surface chemistry of SARS-CoV-2

By Kelly Christensen

Better understanding of the surface chemistry of the SARS-CoV-2 virus is needed to reduce transmission and accelerate vaccine design.

Researchers at Michigan Tech, TÜV SÜD UK National Engineering Laboratory and University of Edinburgh call for increased research on virus surface stability and interaction in "Surface Chemistry Can Unlock Drivers of Surface Stability of SARS-CoV-2 in Variety of Environmental Conditions" in the journal *Cell Press*. They highlight the need to understand the different environmental conditions that affect the surface chemistry of viruses like SARS-CoV-2, the virus that causes the disease COVID-19.



Colorized scanning electron micrograph of a cell (blue) heavily infected with SARS-CoV-2 virus particles (red), isolated from a patient sample. Image captured at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID

Creating an Unfriendly Surface for Viruses

We're told to wash our hands with soap for 20 seconds to kill viruses. Why? Because the soap interacts with the surface chemistry of a virus, particularly the lipid, or fatty, casing around it, and essentially makes the virus explode.

Handwashing is a clear example of why understanding how viruses interact with surface environments is important. Increased research will better equip us to diminish how long viruses survive on surfaces or in the air, an important way to stop the spread.

"If the surface is not friendly, it's easier for the virus to fall apart. Where the virus has more friendly interactions with the surface, it's more likely to stay infectious," said Caryn Heldt, professor of chemical engineering and director of the Health Research Institute at Michigan Technological University.

"Viruses have unique ways of interacting with surfaces. The surface chemistry of the virus will change how the virus interacts with water," Heldt said. "If water such as humidity, which is common in your breath and in the air, gets between the virus and a surface, it can really change the way the virus interacts with that surface. The virus surface and the environment: you can't separate them out."

More than One Way to Skin a Cat... Or a Virus

Part of the reason the scientific community's understanding of the SARS-CoV-2 virus continues to evolve is because there are only a few techniques available to measure the small amounts of virus particles required to infect a person as compared to other types of biomolecules, such as proteins.

"We need to understand how viruses interact with surfaces with and without water present, but the traditional ways we think of studying surface chemistry cannot detect these low levels of virus," Heldt said.

Heldt and coauthors said their article provides a broad overview of different ways researchers could learn more about these surface interactions on a chemical level.

Unlike the viruses that cause influenza, SARS-CoV-2 is mainly transmitted through aerosols, or particles that travel through and stay suspended in the air when people talk, sing, cough or sneeze.

The flu is transmitted by large droplets you breathe out, which fall to and stay infectious on surfaces. Heldt said surfaces have not been ruled out as a mode of transmission, but that the most common form of transmission seems to be aerosol inhalation. "It's about how close you are to someone and for how long," she said.

Temperature and humidity in particular seem to have greater effects on the SARS-CoV-2 virus' virility.

"For the first time, we highlight potential mechanisms of the novel SARS-CoV-2 surface stability in various environmental conditions including temperature and relative humidity," said Aliakbar Hassanpouryouzband, a postdoctoral research associate at the University of Edinburgh.

While viruses are typically more stable when it's colder, which explains why flu season hits during the winter, that doesn't seem to be the case for the virus that causes COVID-19. However, researchers can infer from what heat does to molecules—it increases their energy, causing them to move and vibrate more quickly—that increased vibrations of virus molecules causes them to explode and no longer be infectious.

When it comes to humidity, viruses need to bind some water to their surfaces. But dehydrating a virus molecule isn't a cut-and-dried solution—it can actually make some molecules more stable.

Along with further research into the effects of humidity, temperature and other environmental conditions, there's a need to explore the effects of pH balance and protein casings on the virus. The work to better understand the surface chemistry of SARS-CoV-2 will help scientists around the world design vaccines for this pandemic and those of the future.

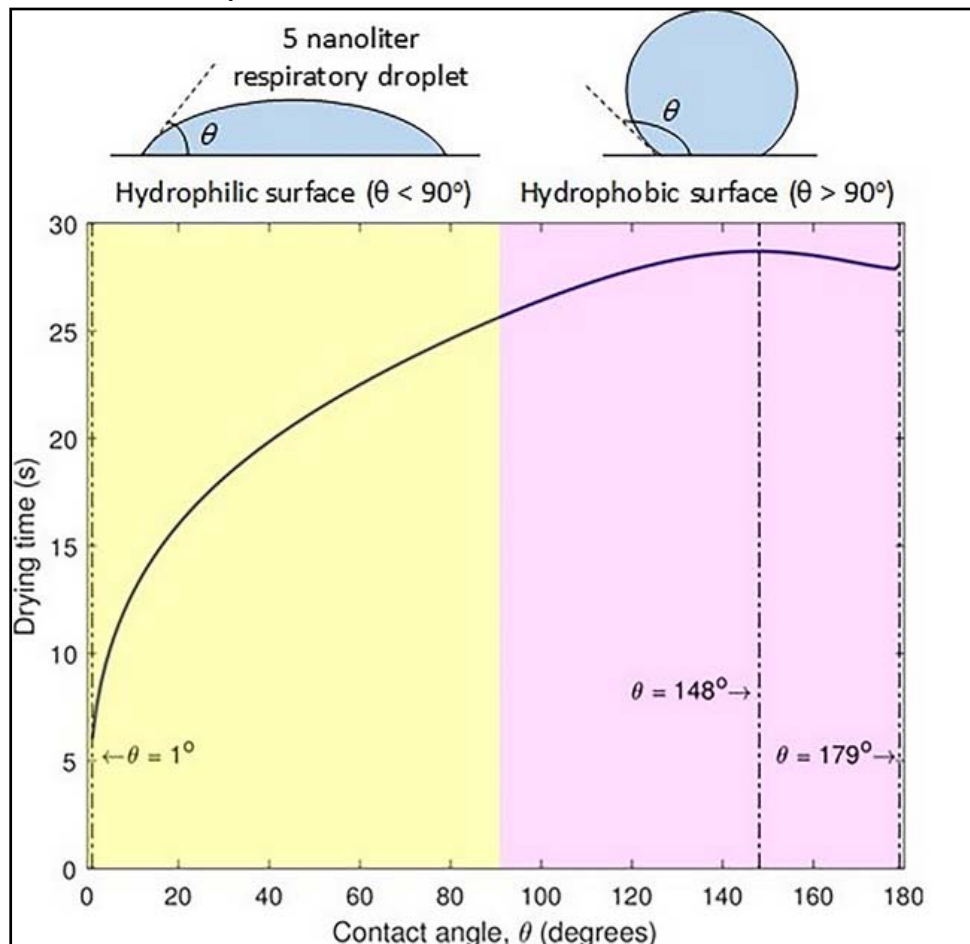
"We hope that this article will assist experimental scientists worldwide in their investigations for unraveling the molecular drivers implicated in this new coronavirus transmission from the surfaces as well as in vaccine development and antiviral drug design," said Edris Joonaki, fluid properties expert at TÜV SÜD UK National Engineering Laboratory.

More information: Edris Joonaki et al. Surface Chemistry Can Unlock Drivers of Surface Stability of SARS-CoV-2 in Variety of Environmental Conditions, *Chem* (2020). DOI: [10.1016/j.chempr.2020.08.001](https://doi.org/10.1016/j.chempr.2020.08.001)

Journal information: [Chem](https://chem.sciencemag.org/)
<https://phys.org/news/2020-08-surface-chemistry-sars-cov-.html>

Making masks and PPE with hydrophilic surfaces, could reduce infection risk

Since the COVID-19 virus spreads through respiratory droplets, researchers in India set out to explore how droplets deposited on face masks or frequently touched surfaces, like door handles or smartphone touch screens, dry.



Drying time of a 5-nanoliter droplet as a function of the contact angle on the surface. Credit: R. Bhardwaj and A. Agrawal

Droplets can be expelled via the mouth or nose while coughing, sneezing or simply talking. These droplets are tiny, around twice the width of a human hair, and studies have shown a substantially reduced chance of infection once they dry.

In *Physics of Fluids*, Rajneesh Bhardwaj and Amit Agrawal, professors at IIT Bombay, publish findings that surface wetting properties to reduce the drying time of droplets could help lessen the risk of infection from coronaviruses.

"We wanted to quantify the droplet drying time on various surfaces and make a recommendation for the ideal types of surfaces for masks and personal protective equipment (PPE) based on the drying time," said Bhardwaj.

By studying the drying time of a droplet for different contact angles, the expected chances of survival of the coronavirus on a surface can be estimated by using a mathematical physics model.

"Our calculations of the drying time as a function of contact angle show that the droplet dries roughly four times faster on the hydrophilic surface that attracts water than on the one that repels water. This will drastically reduce the chances of virus survival," Bhardwaj said.

Their work also shows that, by tailoring the surface wettability and drying time, the chances of infection can be reduced.

"Making a surface more hydrophilic reduces the drying time, and it is advisable to use it for masks, PPE and frequently touched surfaces where outbreaks are most likely to occur, such as the common areas within hospitals," said Agrawal.

In the case of N95 respirators, surgical masks and PPE bodywear, a reduction to a contact angle of a hydrophilic surface implies that the chances of infection of COVID-19 will be cut in half.

"We recommend reducing the contact angle of the surface of face masks and frequently touched surfaces," Agrawal said.

The biggest surprise was their finding that the maximum drying time occurs at an intermediate contact angle value of 148 degrees.

"This implies that a superhydrophobic surface needs to be made even more superhydrophobic to reduce the drying time," Agrawal said. "This is counterintuitive, because we normally think of making a surface more hydrophilic, reducing the contact angle, to reduce the drying time."

This work provides a better understanding of coronavirus survival within a drying droplet, which may be helpful for predicting the survival of other transmissible diseases spread through respiratory droplets, such as the flu.

More information: "Tailoring surface wettability to reduce chances of infection of COVID-19 by a respiratory droplet and to improve the effectiveness of personal protection equipment," *Physics of Fluids* (2020). aip.scitation.org/doi/10.1063/5.00020249

Journal information: *Physics of Fluids*
<https://phys.org/news/2020-08-masks-ppe-hydrophilic-surfaces-infection.html>



Wed, 12 Aug 2020

Why does COVID-19 impact only some organs, not others?

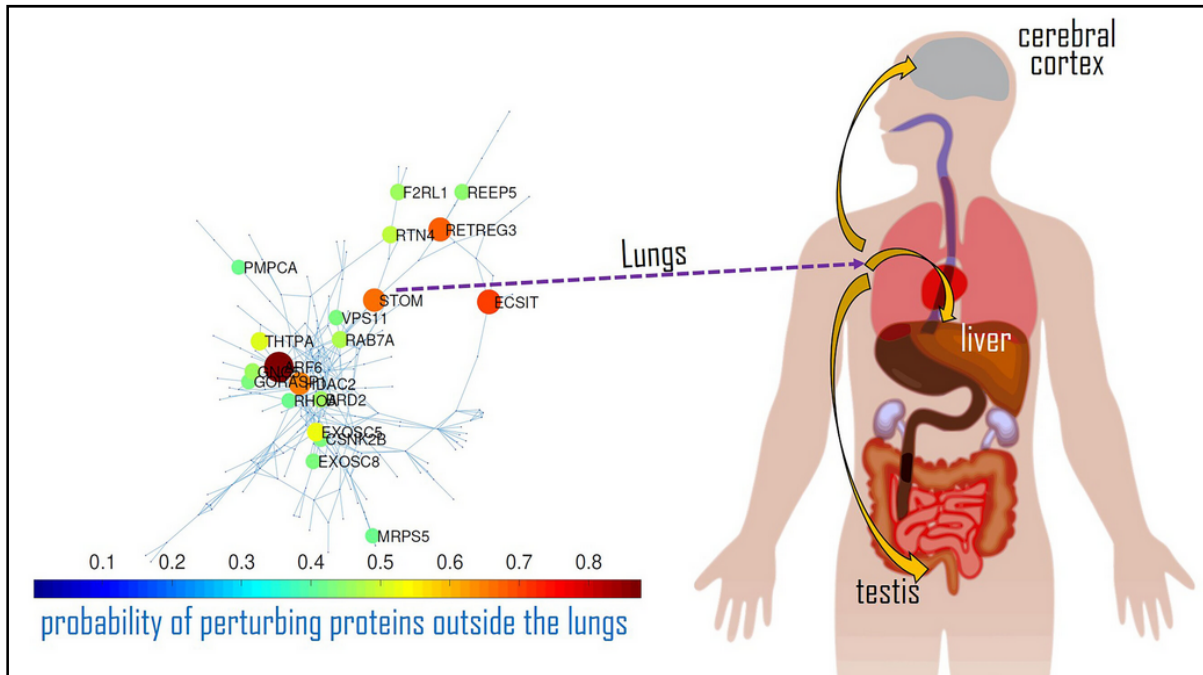
In severe cases of COVID-19, damage can spread beyond the lungs and into other organs, such as the heart, liver, kidney and parts of the neurological system. Beyond these specific sets of organs, however, the virus seems to lack impact.

Ernesto Estrada, from the University of Zaragoza and Agencia Aragonesa para la Investigación Foundation in Spain, aimed to uncover an explanation as to how it is possible for these damages to propagate selectively rather than affecting the entire body. He discusses his findings in the journal *Chaos*.

In order to enter human cells, the coronavirus relies on interactions with an abundant protein called angiotensin-converting enzyme 2.

"This receptor is ubiquitous in most human organs, such that if the virus is circulating in the body, it can also enter into other organs and affect them," Estrada said. "However, the virus affects some organs selectively and not all, as expected from these potential mechanisms."

Once inside a human cell, the virus's proteins interact with those in the body, allowing for its effects to cultivate. COVID-19 damages only a subset of organs, signaling to Estrada that there must be a different pathway for its transmission. To uncover a plausible route, he considered the displacements of proteins prevalent in the lungs and how they interact with proteins in other organs.



An interaction map of the main disease activators for SARS-CoV-2 in the lungs and how they impact proteins in other organs. Credit: Ernesto Estrada

"For two proteins to find each other and form an interaction complex, they need to move inside the cell in a subdiffusive way," Estrada said.

He described this subdiffusive motion as resembling a drunkard walking on a crowded street. The crowd presents obstacles to the drunkard, stunting displacement and making it difficult to reach the destination.

Similarly, proteins in a cell face several crowded obstacles they must overcome in order to interact. Adding to the complexity of the process, some proteins exist within the same cell or organ, but others do not.

Taking these into account, Estrada developed a mathematical model that allowed him to find a group of 59 proteins within the lungs that act as the primary activators affecting other human organs. A chain of interactions, beginning with this set, triggers changes in proteins down the line, ultimately impacting their health.

"Targeting some of these proteins in the lungs with existing drugs will prevent the perturbation of the proteins expressed in organs other than the lungs, avoiding multiorgan failure, which, in many cases, conduces the death of the patient," Estrada said.

How the affected proteins travel between organs remains an open question that Estrada is dedicating for future studies.

More information: "Fractional diffusion on the human proteome as an alternative to the multi-organ damage of SARS CoV-2," *Chaos*, aip.scitation.org/doi/full/10.1063/5.0015626.

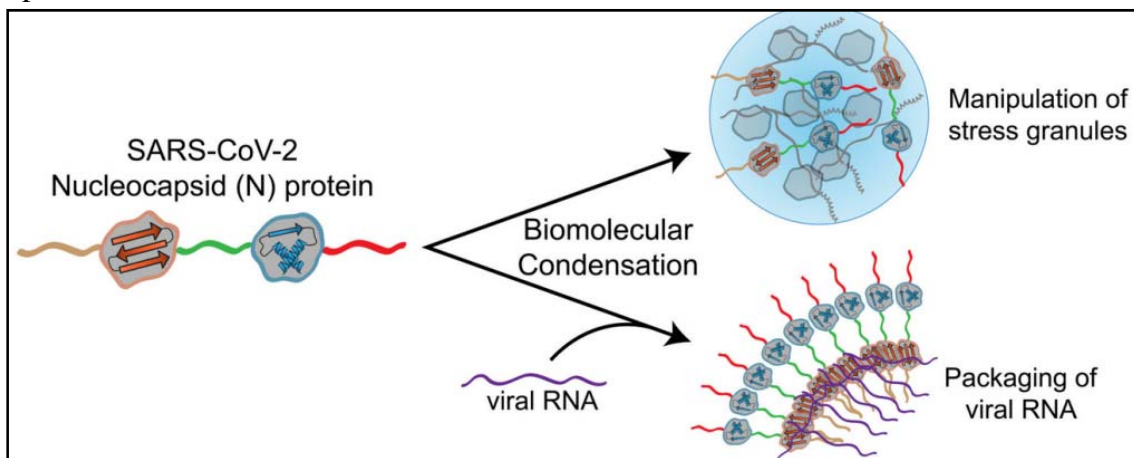
Journal information: *Chaos*
<https://phys.org/news/2020-08-covid-impact.html>

Researchers identify a protein that may help SARS-CoV-2 spread rapidly through cells

By Allie Ruckman

Eric Ross and Sean Cascarina, biochemistry and molecular biology researchers at Colorado State University, have released a research paper identifying a protein encoded by SARS-CoV-2, the virus that causes COVID-19, that may be associated with the quick spread of the virus through cells in the human body.

Through powerful application of the foundational sciences and bioinformatic analysis their research highlights key characteristics of the virus that could one day be important in the development of a treatment for COVID-19.



Credit: Colorado State University

Before COVID-19, Ross and Cascarina had been studying prions—misfolded proteins that can transmit their abnormal shape onto normal variants of the same protein. Prions cause several fatal and transmissible neurodegenerative diseases, including Mad Cow Disease in cattle and Creutzfeldt-Jakob disease in humans. Cascarina's sub-focus has been on low-complexity domains—regions in a protein's sequence that differ from typical regions in their amino acid composition and chemical behavior.

What makes these low-complexity protein domains interesting is their tendency toward liquid-liquid phase separation, similar to oil separating from water. Some of these proteins form "biomolecular condensates" in a cell, which are small areas in a cell where the protein is highly-concentrated, analogous to the oil droplets that form when oil separates from water.

Creating new virus packages

When Ross and Cascarina pivoted to study COVID-19 earlier this year, they found that the nucleocapsid, or N, protein in the SARS-CoV-2 virus has a low-complexity domain that may utilize liquid-liquid phase separation to facilitate the packaging of viral RNA into new virus particles that can infect neighboring cells.

The N protein may also be associated with reducing an infected cell's anti-viral stress response. Cells often form something called stress granules, a type of biomolecular condensate, to respond to a change in their environment, and these granules may have an anti-viral effect.

"The cell can react to a stress event by making changes in the cellular environment," said Ross, "including making these modifications to some proteins."

"But viruses obviously want to avoid a cell's defenses," Cascarina added. "They want to be infectious, so sometimes they are able to regulate these stress granules." By hijacking the normal stress response, the virus may be able to reduce the cell's anti-viral response capabilities.

Since the acceptance of their paper on May 31, four other labs across the country have confirmed parts of Cascarina's hypothesis about the N protein.

The application of this research could be for the development of treatments once a person has already contracted the virus, rather than preventing infection like a vaccine. Both of these areas of research are essential to slowing and ending the COVID-19 pandemic.

"Medically, if you could counteract the virus' ability to interfere with a cell's immune response, then you could help the cells to fight off the virus," said Ross. "I think this falls into the category of very basic science: if we understand the viral process, then conceivably we can try to design a drug that reverses that process."

More information: Sean M. Cascarina et al. A proposed role for the SARS-CoV-2 nucleocapsid protein in the formation and regulation of biomolecular condensates, *The FASEB Journal* (2020). [DOI: 10.1096/fj.202001351](https://doi.org/10.1096/fj.202001351)

Journal information: [FASEB Journal](https://phys.org/news/2020-08-protein-sars-cov-rapidly-cells.html)
<https://phys.org/news/2020-08-protein-sars-cov-rapidly-cells.html>



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Russia announces world's first Covid-19 vaccine, Putin's daughter gets vaccinated

- *This morning, for the first time in the world, a vaccine against the new coronavirus was registered', said Putin*
- *Russia dubbed its newly launched vaccine against coronavirus 'Sputnik V' after the Soviet satellite, the head of the country's sovereign wealth fund said*

Amid the race to develop a Covid-19 vaccine, Russian President Vladimir Putin launched a coronavirus vaccine, touted as the world's first such vaccine, too. The registration of the vaccine lays ground for mass inoculation even as the final stages of clinical trials to test safety and efficacy continue.

The announcement came in the wake of the novel coronavirus pandemic that has infected more than 20 million people and killed nearly 750,000 worldwide, thus, crippling world economies.

Russia dubbed its newly launched vaccine against coronavirus "Sputnik V" after the Soviet satellite, the head of the country's sovereign wealth fund said, as per reports.

Kirill Dmitriev, the head of the Russian Direct Investment Fund which finances the vaccine project, said Phase 3 trials would start on Wednesday, industrial production was expected from September and that 20 countries had pre-ordered more than a billion doses, AFP reported.

Further, the president has asked Health Minister Mikhail Murashko to keep him informed about the Covid-19 vaccine, while at the same time noting that he knows "it works quite effectively" and "forms a stable immunity", according to Russian news agencies.

"This morning, for the first time in the world, a vaccine against the new coronavirus was registered" in Russia, Putin said during a televised video conference call with government ministers, as per news agency AFP.

Putin further thanked everyone who worked on the vaccine's development and described it as "a very important step for the world". He hopes the country's research body will soon start mass production of coronavirus vaccine.

"I know that it works quite effectively, forms strong immunity, and I repeat, it has passed all the needed checks," said Putin.

He emphasized that the vaccine underwent the necessary tests. He added that one of his two daughters has received a dose of the vaccine and is feeling well, according to Associated Press reports.

Putin said that his daughter had a temperature of 38 degrees Celsius (100.4 Fahrenheit) on the day of the first vaccine injection, and then it dropped to just over 37 degrees (98.6 Fahrenheit) on the following day. After the second shot she again had a slight increase in temperature, but then it was all over. "She's feeling well and has high number of antibodies," Putin added.

However, the vaccine's registration is conditional and trials will continue while production gets underway, said Murashko.

Murashko also added that the first Russian vaccine against the coronavirus will begin to be produced at two sites - the Gamaleya Research Institute and the company Binnopharm.

"The two-stage injection plan helps form a lasting immunity. The experience with vector vaccines and two-stage scheme shows that immunity lasts for up to two years", the Health Ministry said, as reported by Sputnik News.

Currently, WHO and Russian health authorities are discussing the process for possible WHO prequalification for its newly approved COVID-19 vaccine, a WHO spokesman said today.

"We are in close contact with Russian health authorities and discussions are ongoing with respect to possible WHO prequalification of the vaccine, but again prequalification of any vaccine includes the rigorous review and assessment of all required safety and efficacy data," WHO spokesman Tarik Jasarevic told a U.N. briefing in Geneva, referring to clinical trials, according to Reuters.

Moreover, the president has tasked the government with ensuring funding for flu and coronavirus vaccination after vaccines are registered, noting that up to 60% of Russians should be vaccinated against flu.

Russia's first coronavirus vaccine is developed jointly by Gamaleya Research Institute and the Russian Defence Ministry.

Clinical trials of the vaccine began on June 18 and included 38 volunteers. All of the participants developed immunity. The first group was discharged on July 15 and the second group on July 20.

In an earlier report, the final check-up of volunteers testing the coronavirus vaccine showed immunity in all participants, the Russian Defence Ministry said.

Alexander Gintsburg, director of the Gamaleya National Research Centre, said that vaccine used inanimate particles created on the basis of adenovirus, according to Sputnik News.

He said there are no concerns that the vaccine could potentially cause harm to a person's health. "The particles and objects that can reproduce their own kind are the ones that are considered alive. The particles in question cannot multiply," he added.

Amid the testing and development, Russian health workers treating Covid-19 patients is planned to be offered the chance of volunteering to be vaccinated soon after the vaccine's approval, a source told Reuters last month. Authorities are considering getting doctors and teachers vaccinated against the virus initially as well.

In April, Putin ordered state officials to shorten the time of clinical trials for a variety of drugs, including potential coronavirus vaccines.

However, various industry bodies and pharmaceutical companies have called Russia's rushed registration dangerous. They have questioned its extensive push to develop a vaccine as soon as this year's end. The roll-out of this vaccine has stirred concerns that it may be putting national prestige before science and safety.

Dr Anthony Fauci, the top US infectious disease specialist, questioned the fast-track approach last week. "I do hope that the Chinese and the Russians are actually testing a vaccine before they

are administering the vaccine to anyone, because claims of having a vaccine ready to distribute before you do testing I think is problematic at best," he said.

WHO had earlier said all vaccine candidates should go through full stages of testing before being rolled out.

More than 100 possible vaccines are being developed around the world to try to stop the pandemic. At least four are in final Phase III human trials, according to WHO data.

Companies including AstraZeneca Plc and Moderna Inc. are still conducting final-stage trials of their vaccines in studies that are expected to soon yield results.

Additionally, a vaccine developed by Germany's BioNTech and US pharma giant Pfizer entered phase 3 last month, with the companies planning to test it on 30,000 young volunteers.

The American firm Moderna also says it plans to trial its vaccine among 30,000 people.

Since mid-July China's Sinopharm has begun testing its candidate on 15,000 people in the United Arab Emirates.

Meanwhile, Philippine President Rodrigo Duterte has accepted Russia's offer of its coronavirus vaccine, volunteering to take the first shot as a gesture of trust and gratitude. "When the vaccine arrives, I will have myself injected in public. Experiment on me first, that's fine with me," Duterte said on Monday.

On Tuesday, Russia registered 4,945 new cases of the novel coronavirus, pushing its national case tally to 897,599, the fourth largest in the world.

The official death toll rose to 15,131 after authorities said in their daily coronavirus report that 130 people had died in the previous 24 hours.

With inputs from agencies

<https://www.livemint.com/news/world/russia-develops-world-s-first-covid-19-vaccine-putin-s-daughter-gets-vaccinated-11597135192189.html>



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'Secret behind high speed of Russia's COVID-19 vaccine creation was the country's expertise in vaccine research'

'Secret behind high speed of Russia's COVID-19 vaccine creation was the country's expertise in vaccine research'

Moscow [Russia], August 11 (ANI): After the first coronavirus vaccine in the world was registered in Russia, Russian Direct Investment Fund (RDIF) CEO Kirill Dmitriev said, in his opinion piece for Sputnik, that the secret behind the high speed of Russia's COVID-19 vaccine creation was the country's expertise in vaccine research.

Dmitriev also praised the unique two-vector approach of the Gamaleya Microbiology Research Center, reported Sputnik.

Shortly after announcing the first COVID-19 vaccine, Russian President Vladimir Putin on Tuesday said his daughter, who was given a shot of the vaccine, had developed a slight fever but then recovered and now her antibody titers are high.

"In this sense, she took part in the experiment. After the first vaccination, she had a body temperature of 38 degrees Celsius, while the following day it was slightly over 37 degrees Celsius, that's it. After the second injection, the second vaccination, her temperature also rose a little, and then everything cleared up, she feels good and the [antibody] titers are high," Sputnik quoted Putin as saying earlier in the day.

According to the report, the vaccine, named Sputnik V, was developed jointly by the Gamaleya Research Institute and the Russian Defense Ministry.

While many Western media outlets and politicians question the high speed of Russia's COVID-19 vaccine creation, expressing concerns about its efficacy and authenticity, the secret behind this success is the country's expertise in vaccine research, the RDIF chief noted, reported Sputnik. Ever since the outbreak of coronavirus, which has infected millions worldwide, several companies were in the race to develop a vaccine.

"Since the 1980s, the Gamaleya Center has led the effort to develop a technological platform using adenoviruses, found in human adenoids and normally transmitting the common cold, as 'vectors' or vehicles, which can induce a genetic material from another virus into a cell ... The technological platform of adenovirus-based vectors makes it easier and faster to create new vaccines through modifying the initial carrier vector with genetic material from new emerging viruses," Dmitriev explained.

"Other countries follow in our footsteps developing adenoviral vector-based vaccines. Oxford University is using an adenovirus from a monkey, which has neither been used in an approved vaccine before unlike human adenoviruses. U.S. company Johnson & Johnson is using adenovirus Ad26 and China's CanSino - adenovirus Ad5, the same vectors the Gamaleya Center is using, but they are yet to master the two-vector approach," Dmitriev added.

RDIF believes that adenoviral vector-based vaccines will be the winners "in the global vaccine race to fight coronavirus," but even in this category the Gamaleya vaccine "has the edge," the official concluded, according to the Sputnik report.

According to the Indian Council of Medical Research (ICMR), three Indian COVID-19 vaccines are in different phases of clinical testing at present.

The Oxford vaccine, being manufactured by Serum Institute of India (SII) got approval for phase 2 and 3 clinical trials, the Indian Council of Medical Research said on August 3.

The University of Oxford had begun the clinical trials of a potential COVID-19 vaccine on humans in April. The Oxford vaccine -- called ChAdOx1 nCoV-19 -- is made from a harmless chimpanzee virus, the university confirmed to CNN.

On May 5, The Jerusalem Post reported the Israel Institute for Biological Research (IIBR), a secretive unit that works under the Prime Minister's Office, of confirming that the development phase of COVID-19 antibody or passive vaccine that attacks the virus and neutralises it in the body has been completed.

According to the latest global update by the Johns Hopkins University, a total number of 20,092,855 people have been tested positive of coronavirus and 736,254 deaths have been reported so far.

The World Health Organisation had declared the outbreak of the new coronavirus a pandemic on March 11. (ANI)

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<http://www.businessworld.in/article/-Secret-behind-high-speed-of-Russia-s-COVID-19-vaccine-creation-was-the-country-s-expertise-in-vaccine-research-/11-08-2020-307557/>

Covid-19 latest updates: 3 Indian vaccines under trial, Russia to allow civilian use this week

According to the Indian Council of Medical Research, three Indian vaccines are in different phases of clinical testing at present

Edited By Amit Chaturvedi

Pharmaceutical companies in India and around the world are putting in great efforts to treat the coronavirus disease which has infected more than 20 million people so far.

Many scientific studies are also being done as part of efforts to find treatments and vaccines for Covid-19, the illness caused by the Sars-CoV-2 virus.

A total of 26 vaccine candidates are being developed, according to the World Health Organisation, as a process normally taking up to 15 years has been squeezed into a matter of months. Here's everything you need to know about the global efforts being made to find a vaccine fast for Covid-19:

In India, an expert committee on vaccine administration will meet on Wednesday to consider "logistics and ethical aspects" of procurement and administration of vaccines against Covid-19, the Union health ministry said today. The committee will be chaired by NITI Aayog's Dr VK Paul. The coronavirus disease has infected more than 2.2 million people and killed over 44,000 in India.

- According to the Indian Council of Medical Research (ICMR), three Indian vaccines are in different phases of clinical testing at present. Two of these vaccines - Bharat Biotech vaccine and DNA vaccine of Zydus Cadila have completed phase 1 and will begin phase 2 clinical trials, said the ICMR.
- Oxford vaccine, being manufactured by Serum Institute of India (SII) got approval for phase 2 and 3 clinical trials, which are starting within a week at 17 sites, the institute said.
- Karnataka's deputy chief minister Dr CN Ashwath Narayan said on Tuesday that the state government is very keen to establish an Immunology and Vaccine Research Centre in Bengaluru in collaboration with the Emory Vaccine Centre of Atlanta University.
- Serum Institute of India (SII) had said last week that it has entered into a new partnership with international vaccine alliance Gavi and Bill & Melinda Gates Foundation to accelerate manufacturing and delivery of up to 100 million doses of Covid-19 vaccines for India as well as other low and middle-income countries. SII CEO Adar Poonawalla told a TV channel that the company will start manufacturing the vaccines by end of August.
- Globally, Russia is racing ahead to allow civilian use of a potential coronavirus vaccine before clinical trials are complete. The government plans to give a vaccine developed by Moscow's Gamaleya Institute conditional registration as early as this week, which would open the door to civilian use. This has led an industry body to call this rush dangerous for the common people. Yet less than 100 people had officially received the inoculation against the epidemic by early August and its widespread use could be dangerous, the Association of Clinical Trials Organizations said in a letter sent to Health Minister Mikhail Murashko on Monday.
- Meanwhile, Moderna has become the first company in the world to begin phase 3 testing of its coronavirus vaccine. The tests are being carried out at its facilities in the United States. The tests started on July 27 and the company plans to enroll 30,000 study subjects.
- Pfizer too started its combined phase 2 and 3 study on July 27 and hopes to enroll 30,000 volunteers by September. The company's CEO Albert Bourla said they have vaccinated more than 2,000 people by first week of August.

<https://www.hindustantimes.com/india-news/covid-19-latest-updates-3-indian-vaccines-under-trial-russia-to-allow-civilian-use-this-week/story-eUNncepriH354QPIOjXfIK.html>

