

Aug  
2020

# समाचार पत्रों से चयित अंश Newspapers Clippings

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

Volume: 45 Issue: 194 20 August 2020



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## **Defence import embargo: Opportunity and challenge for Indian industry**

*The embargo on imports is planned to be progressively implemented between 2020 and 2024*

*By Ramu Patil*

Bengaluru: On the morning of January 4, 2001, when the homegrown fighter soared into the clear skies over Bengaluru on its maiden flight, it put to rest any doubts over India's capabilities to make a state-of-the-art Light Combat Aircraft (LCA). It gave a new dimension to 'atmanirbharta', or self-reliance, in defence preparedness as well as manufacturing. Nearly 20 years later, the LCA, which is now part of the Indian Air Force (IAF) fleet, figures on the list of 101 items that the Ministry of Defence (MoD) has embargoed for import. Though many of those items are already made or being manufactured locally, the decision, which is part of the Centre's push for its ambitious Atmanirbhar Bharat initiative, is expected to give a new thrust to the Indian defence industry.

"It is a step in the right direction to stimulate the Indian defence industry and thereby head towards self-reliance," said Air Marshal BK Pandey (Retired), former Chief of Indian Air Force (IAF) Training Command, Bengaluru. "Most of the items like the LCA, Light Combat Helicopter, Basic Trainer, Light Transport Aircraft are already manufactured here. What the government wants to do now is not to put unnecessary pressure of competition on local industry by importing. The Services will not be able to initiate cases for import of items in this category."



The embargo on imports is planned to be progressively implemented between 2020 and 2024. The list comprises 101 items including hi-tech weapons systems like artillery guns, assault rifles, sonar systems, transport aircraft, LCHs, radars and others. According to the MoD, almost 260 schemes of such items were contracted by the Tri-Services at an approximate cost of Rs 3.5 lakh crore between April 2015 and August 2020. Now, it is estimated that contracts worth almost Rs 4 lakh crore will go to the domestic industry in the next five to seven years.

Dr Ajey Lele, Senior fellow at the Institute for Defence Studies and Analysis (IDSA), New Delhi, sees it as a very important step from the Indian industry point of view, as they get huge clarity on where they stand, what they should manufacture and what could be their key areas of focus. "There was a certain amount of ambiguity in the industry, as well as the Armed Forces. Private industry used to think that whatever they invested in, the forces would import the equipment ultimately. Now, there is clarity in the minds of both parties," he said. For the industry, it will be a huge opportunity as well as a challenge at the same time.

### **‘Indian defence industry should rise to occasion’**

“Since the government has taken the call, the industry has to accept the fact that if they want a market, they better pull up their socks and start delivering things in time. Everyone understands that there will be some teething troubles,” says Dr Ajey Lele. “Platform technologies are going to be challenging. The earlier we do it, the better it is for the future. Industry will quickly reorient itself to get into the groove and address these issues,” he added.

Dr Kota Harinarayana, former Director, Aeronautical Development Agency (ADA) - known as the ‘Father of LCA Project’ - says the ‘Tejas’ created an ecosystem in terms of development of technology, equipment and manufacturing of components. “That is what makes the country undertake indigenous production of most of the equipment,” says Dr Harinarayana, in whose honour the letters ‘KH’ have been inscribed on the aircraft. “The LCA is already indigenous; they will not import any lightweight fighters,” he said.

Prior to taking up the LCA project, only Hindustan Aeronautics Ltd (HAL) was designing and developing aircraft. Now, many agencies including ADA, National Aerospace Laboratory (NAL), Aeronautical Development Establishment (ADE) and others, besides a number of private firms, are part of aircraft development projects. “India’s capability and capacity is such that the decision can be adhered to and even (the list can be) expanded,” he added.

“It is a very good decision. The list is small, there are many more items that can be added to it,” concurs Dr C G Krishnadas Nair, former CMD of HAL and Honorary President, Society of Indian Aerospace Technologies & Industries (SIATI). According to him, Indian industries will be able to deliver quality products without delay, and the cost too will be lower.

**HAL can now expedite projects for faster induction into Armed Forces: HAL Chief Bengaluru:** Hindustan Aeronautics Ltd Chairman and Managing Director R Madhavan said the move to ban the import of 101 defence items gives a major boost to the Indian defence manufacturing ecosystem. “This is positive news for HAL, as all our major platforms, including LCA Mk1A, Light Combat Helicopter, Basic Trainer Aircraft (HTT-40), Fixed Wing Mini UAVs and Transport Aircraft (Do-228), etc, are on the list,” he stated. With assured orders, a large number of Tier-2 and Tier-3 vendors will now come forward to partner with the Indian industry as the products will be exclusively manufactured in India. There will also be greater visibility for small players.

The aerospace ecosystem can be further nurtured and the industry can build infrastructure capability for fulfilling the projects, he said. “HAL can now expedite the projects for faster induction into the Armed Forces and its resources can be optimally utilised. As an industry leader, HAL will further strengthen its role as an integrator, providing impetus to many more aerospace initiatives to build a self-reliant India. It is important that all stakeholders hand-hold and strengthen the Make-in-India drive,” he added.

### **Hope for engine project**

Certain challenges persist, however, especially in terms of developing a jet engine, as the project did not make much headway even after several years. But experts like Dr Kota Harinarayana, the former Director of ADA, are confident that India will be able to tackle this issue in a few years.

<https://www.newindianexpress.com/nation/2020/aug/20/defence-import-embargo-opportunity-and-challenge-for-indian-industry-2185785.html>

## **IAF test fires air-to-air missiles ahead of Rafale integration**

*Acquired from France, MICA is an all weather missile system available in both short and medium ranges*

*By Hemant Kumar Rout*

Bhubaneswar: Amid a protracted stand-off along the LAC, the Indian Air Force (IAF) has accomplished a secret mission by conducting several rounds of air-to-air missiles that have recently been acquired from France and Russia from a frontline fighter aircraft off Odisha coast.

Defence sources said anti-air multi-target MICA missile fired from Sukhoi-30 MKI for the first time successfully destroyed expendable aerial targets (EATs), demonstrating its stealth capabilities. Ahead of the planned integration with multi-role combat aircraft Rafale, the IAF test fired two rounds of Beyond Visual Range (BVR) air-to-air missile MICA on Monday and Tuesday.

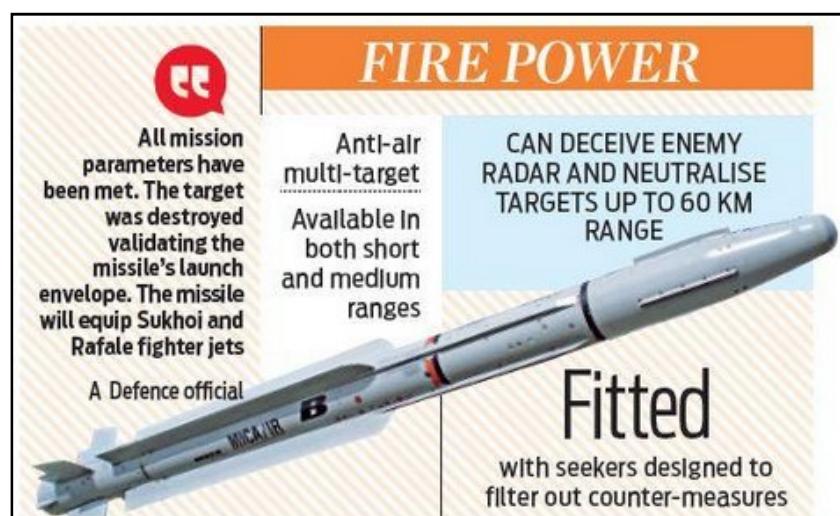
The fighter aircraft took off from Kalaikunda airbase in West Bengal and fired the missile, successfully neutralising the aerial target drone mimicking enemy aircraft at low altitude. “All mission parameters have been met as the target was destroyed validating the missile’s launch envelope. The missile will equip both Sukhoi and Rafale fighter jets,” a defence official told ‘The Express’.

Acquired from France, MICA is an all weather missile system available in both short and medium ranges. The fire-and-forget missile can be used both by air platforms as well as ground units and ships.

The 3.1 metre long missile having a diameter of 0.16 m weighs around 112 kg. It can neutralise targets within a



The first five IAF Rafales have taken off from Dassault Aviation Facility, Merignac, France today morning. These five include three single-seater and two twin-seater aircraft. (Photo | IAF)



**FIRE POWER**

**Anti-air multi-target**  
Available in both short and medium ranges

**CAN DECEIVE ENEMY RADAR AND NEUTRALISE TARGETS UP TO 60 KM RANGE**

**Fitted**  
with seekers designed to filter out counter-measures

All mission parameters have been met. The target was destroyed validating the missile's launch envelope. The missile will equip Sukhoi and Rafale fighter jets

A Defence official

MICA IR

range of 500 metre to 60 km. Of its two variants guided by radio frequency (RF) and infrared (IR), MICA-RF has an active radar homing seeker and MICA-IR has an imaging infra-red homing seeker. Both seekers are designed to filter out counter-measures.

Last week, the IAF had conducted two rounds test of R-77 air-to-air missile acquired from Russia. The multi-purpose missile can be used against a range of aircraft, both tactical and strategic and from hovering helicopters to high-speed at different altitudes. The medium-range air-to-air guided missile R-77 is about 3.6 metre in length and 200 mm in diameter. It weighs around 175 kg. It has an operational range of 80 km to 100 km. Both the missions were conducted by the IAF while the DRDO provided the logistic support. After the successful trial of Dhruvastra last month, the twin missions during the Covid-19 pandemic proved the readiness of the test range.

“The IAF is in the process of upgrading its squadrons. It is also in process of procuring Meteor missile from the European weapon maker MBDA. Rafale will be equipped with MICA and Meteor,” the official added.

<https://www.newindianexpress.com/states/odisha/2020/aug/19/iaf-test-fires-air-to-air-missiles-ahead-of-rafale-integration-2185422.html>



**BHARAT SHAKTI**  
Self-Reliance in Defence

*Thu, 20 Aug 2020*

## **Aatmanirbharta and Indian Navy: A Match Made In Heaven?**

Bhubaneswar: Amid a protracted stand-off along the LAC, the Indian Air Force (IAF) has accomplished a secret mission by conducting several rounds of air-to-air missiles that have recently been acquired from France and Russia from a frontline fighter aircraft off Odisha coast.

On 8 August 2020, the Defence Minister announced an embargo on the import of over 100 defence weapons and platforms. This decision has been taken to provide an opportunity for the Indian Defence Industry, both public and private, to manufacture these items using their R&D or in collaboration with DRDO. This list has reportedly been prepared by the Department of Military Affairs after extensive consultation with all stakeholders, including the three Services.



Significantly, this embargo covers not only low-tech components/machinery but also a significant number of complex platforms and high technology weapons and associated equipment. By doing this, the Government has provided an unprecedented opportunity for local entities to confidently step up their efforts to develop, produce and sustain products for the Indian defence market. Moreover, with defence exports gaining greater salience for national economic growth, the Indian defence industry has been offered a whole new world of opportunities.

Getting back to the list itself, even a cursory glance at the items suggests that the Indian Navy has taken on the lion's share. Shipborne cruise missiles, anti-missile systems, multiple types of vessels including destroyers, corvettes, missile vessels, anti-submarine crafts as well as most of the high-end technologies required by these platforms – all have been incorporated in the 'Atmanirbhar' list. What does this imply for the Navy and the Defence Industry?

It has to be acknowledged that the Navy's developmental plans have always focused on self-reliance. Almost all recent and ongoing major acquisition programmes, are being progressed within the country. Since the first Naval ship was constructed in India in the 1960s, the Navy has worked closely with multiple Indian shipyards to develop a range of vessels, including destroyers, frigates,

submarines and also the first Indigenous Aircraft Carrier being constructed at Cochin Shipyard Ltd. It may, therefore, be fortuitous for the national effort that the Navy has been given pole position in the ‘race to self-reliance’.

The Navy has traditionally taken the lead to enhance and extend its interaction with all stakeholders in Defence production. There are extensive mechanisms for continuous interaction and cooperation with DRDO, Defence PSUs and shipyards, IITs, Governmental labs as well as Private Industry and Start-ups. A dedicated Department of Indigenisation within the Navy has managed these aspects for several years now, and this Department is likely to be expanded to a full-fledged agency to optimize efforts towards comprehensive self-reliance.

The size and scale of the Navy’s well-documented developmental plans provide an excellent roadmap for future efforts of local players. Existing naval programmes have already led to establishment of some MSMEs in niche technologies and this trend could be exponentially increased in future. With the Navy’s focus on ‘standardisation’ in future plans, all developers/manufacturers are likely to benefit from larger orders.

With maritime security rapidly gaining importance internationally, demand for naval weapons and platforms will inevitably continue to increase in Navies world over, particularly in our neighbourhood. It is, therefore, a period of opportunity for India’s defence export ambitions and due focus on the Navy’s requirements could yield significant rewards.

However, all is not rosy at present in the Navy’s self-reliance story. There have been multiple hiccups – long shipbuilding timelines and delayed deliveries, bottlenecks at private shipyards, delay in the modification of indigenous aircraft for use on ships, R&D failures in some niche weapons systems – to state a few.

Moreover, private investment in Naval projects has been minimal due to the penchant for the nomination of DPSUs for big projects. The continuous shrinking of the Navy’s capital budget has further undermined investor confidence. These are the issues, which if firmly and effectively addressed, could springboard India’s Defence industry to a higher level in a relatively short period. One possible way to achieve this could be for the Government to provide financial, procedural and decisional support to ongoing and upcoming Naval plans, for items on the Atmanirbhar List. By providing budgetary support for large scale investments, ensuring a level playing field for private entities, demanding corporate efficiency from public entities, safeguarding individual intellectual property and establishing mechanisms for seamless and transparent user-developer-manufacturer integration, the MoD, through the Indian Navy, can rapidly realise the goals of self-reliance. It is an integral part of India’s culture to meet challenges and opportunities with equal positivity. The challenges of the existing geopolitical climate, particularly the menace posed by our adversarial neighbours to our economic growth, need India’s Navy to growing rapidly to counter them across the Indo-Pacific. At the same time, the opportunity provided by the Atmanirbhar Bharat initiative needs to be fully harnessed to do so. With the Navy’s long and credible track record in self-reliance, the Government must give due focus to the Navy’s plans to achieve its stated goals.

<https://bharatshakti.in/aatmanirbharta-and-indian-navy-a-match-made-in-heaven/>

## Navy effectively protects maritime interests of India: Rajnath Singh

*He also said accepting the challenges arising out of the Covid-19 situation, the Indian Navy has continued to progress the operational, administrative and modernisation efforts*

New Delhi: Defence Minister Rajnath Singh on Wednesday lauded the Indian Navy for effectively carrying out mission-based deployments in the Indian Ocean Region to protect the maritime interests of the country.

As the three-day Naval Commanders Conference 2020 began here on Wednesday against the backdrop of India and China's unprecedented three-month-long stand-off at multiple points along the border in eastern Ladakh, the Minister, in his address at its inaugural session, said that the Navy, by deploying ships and aircraft at major and sensitive locations, safeguards interests of the country.

Rajnath Singh complimented the men and women of Navy for their role in protecting the maritime interests and expressed the confidence in the force's preparedness to meet any challenge through a proactive response in deploying its naval and air assets.

Amid the unprecedented challenge posed by the Covid-19 pandemic, he cited the Indian Navy's biggest-ever repatriation operation "Operation Samudra Setu", which has contributed extensively to the national interest.

Despite the difficult sea conditions and the challenges of dealing with an unseen enemy in the form of coronavirus, the Navy was instrumental in bringing home almost 4,000 people from neighbouring countries in the Indian Ocean Region.

Also, under 'Mission Sagar', medical aid was provided to various island countries of southwest Indian Ocean Region — Maldives, Mauritius, Comoros, Seychelles and Madagascar.

Rajnath Singh also lauded the efforts of all naval commands in setting up of quarantine facilities to aid the civil administration in managing Covid-19.

Talking about Prime Minister Narendra Modi's vision of Security And Growth for All in the Region (SAGAR), he said that the commencement of mission-based deployments in June 2017 have facilitated enhanced Maritime Domain Awareness (MDA), provided swift Humanitarian Aid and Disaster Relief (HADR) to the Indian Ocean Region littorals and security to the international maritime community.

On the dynamic changes taking place in the armed forces, the Minister highlighted the creation of the post of Chief of Defence Staff and Department of Military Affairs as major milestones in bringing more synergy amongst the three services, especially in training, procurement and staffing and bringing jointness in operations.

He also said accepting the challenges arising out of the Covid-19 situation, the Indian Navy has continued to progress the operational, administrative and modernisation efforts. Notwithstanding these fiscal challenges, the government has invoked the Emergency Powers to meet the emergent requirements of the services, he added.

On Indian Navy's proven commitment towards 'Aatmanirbhar Bharat' in consonance with the 'Make in India' initiative, Rajnath Singh appreciated that the Navy has been at the forefront of the indigenisation process.



Union Minister for Defence, Rajnath Singh.  
(File Photo: PIB)



Stressing that it is important that pace be kept with the successes which have been achieved so far, he said that the recently-inaugurated Naval Innovation and Indigenisation Organization (NIIO) is one such step.

<https://www.thestatesman.com/india/navy-effectively-protects-maritime-interests-of-india-rajnath-singh-1502918346.html>



Thu, 20 Aug 2020

## **Maker Village inks MoU with Indian Navy to add value to indigenisation drive**

*Three other innovations were developed using the captive facilities of Maker Village and already handed over to various DRDO Labs*

Kochi: Maker Village-Kochi, the hardware tech incubator, has entered into a memorandum of understanding with the Indian Navy to “actively add value to the innovation and indigenisation drive of the defence establishment”. The MoU was signed during the launch of the ‘Naval Innovation and Indigenisation Organization’ (NIIO) in New Delhi on August 13 by Minister of Defence Rajnath Singh. The MoU was signed by vice chief of naval staff vice admiral Ashok Kumar, and CEO of Maker Village Prasad Balakrishnan Nair.

The engagement is expected to provide a framework for the Innovators and start-ups of Maker Village to actively add value to the innovation and indigenisation drive of the defence establishment. As per the newly formulated framework, Maker Village will focus on meeting the specific requirements of the Navy through innovative methods and promote research in specific areas. “The Navy will assist Maker Village In the development of the assigned products by critically examining the products at the development stage, helping in demonstration trials and providing feedback,” the release said.

Maker Village also shall undertake research projects of the Navy by pooling the competencies of startups from diverse domains, while playing a leadership role in such collaborations. The innovators of Maker Village are already piloting four strategic projects for various arms of the defence and security establishment. Three other innovations were developed using the captive facilities of Maker Village and already handed over to various DRDO Labs.

Kochi-based Maker Village has been inducted as an official partner with the Defence Innovation Organization (DIO) of the Ministry of Defence, Government of India, under the Innovation for Defence Excellence (iDEX) programme of the Centre.

<https://www.newindianexpress.com/cities/kochi/2020/aug/20/maker-village-inks-mou-with-indian-navy-to-add-value-to-indigenisation-drive-2185672.html>

## 'India building new road to Ladakh, for facilitating troop movement without observation from enemy'

New Delhi: In an effort to rush troops and tanks to the Pakistan and China front in Ladakh without being observed by the enemy, India is working on making a new road from Manali to Leh, which will provide the third link between the high altitude mountainous Union Territory (UT) and the rest of the country.

India is also working on providing alternative connectivity to the strategically important Sub-Sector North including the Daulat Beg Oldi and other areas there for the last three years and work has already started from the world's highest motorable road Khardung La pass.



"Agencies are working to provide alternative connectivity from Manali to Leh through Nimu-Padam-Darcha axis which will help in saving a lot of time in comparison with the existing routes passing through Zojila pass from Srinagar and the other route from Manali to Leh through Sarchu," government sources told ANI.

The road will save almost three to four hours journey time while travelling from Manali to Leh and will also not leave any scope for the Pakistanis or other adversaries to monitor the movement of the Indian Army while deploying troops and heavy weaponry like tanks and artillery guns to the Ladakh area from other locations, they said.

The route mainly used for transportation of goods and men is the one from Zojila, which passes through Drass-Kargil axis to Leh. The same route was targeted heavily by the Pakistanis during the Kargil war in 1999 and was subjected to frequent bombarding and shelling by their troops from positions in high altitude mountains alongside the road.

Sources said the work has already started on this project and the new road will connect Manali with Leh near Nimu where Prime Minister Narendra Modi had recently visited during the ongoing conflict with China.

Likewise, to provide alternatives to the strategic Durbuk-Shyok-Daulat Beg Oldi road, India is working on further developing the old summer route on which caravans used to reach eastern Ladakh areas from the western side.

The new road will travel from Leh towards Khardungla and then move through glaciers including the Sasoma-Saser La-Shyok and Daulat Beg Oldi axis.

Senior sources said that the 14 Corps was given the responsibility of finding an alternative to the DSDBO road and check the road coming from near the Siachen camp towards the DBO area, and one unit was sent through there on a trial basis.

The Army unit travelled from Sasoma to Saser La in vehicles and the rest of the area on foot, on the route which is full of bones of double-humped camels which were used to ferry cargo, through the very rough Shyok river during the summers. The new route was earlier used by the Army also to maintain the Sub Sector North.

<https://timesofindia.indiatimes.com/india/india-building-new-road-to-ladakh-for-facilitating-troop-movement-without-observation-from-enemy/articleshow/77639552.cms>

## नेवल कमांडर्स की कॉन्फ्रेंस में बनेगा चीन को डुबोने का प्लान! इन 5 वजहों से ड्रैगन को टेंशन

*India naval commanders meet: चीन के साथ सीमा पर तनाव (Border tension with China)*

*के बीच भारतीय नौसेना (Indian Navy) के कमांडर्स की कॉन्फ्रेंस हो रही है।*

*By Deepak Verma*

भारतीय नौसेना के टॉप कमांडर्स की कॉन्फ्रेंस आज से दिल्ली में शुरू हो रही है। तीन दिन तक चलने वाली यह कॉन्फ्रेंस इसलिए बेहद अहम है क्योंकि चीन के साथ पूर्वी लद्दाख में तनाव बरकरार है। नौसेना पहले से ही हिंद महासागर में ऑपरेशनल अलर्ट पर है। सीमा पर जरा से हालात और खराब हुए तो नेवी पूरी ताकत के साथ दुश्मन को समुद्र में तहस-नहस के लिए पूरी तरह तैयार है। जंगी जहाज, सर्विलांस और एयरक्राफ्ट कैरियर्स पूरी तरह से मुस्तैद हैं। और तो और, लद्दाख सेक्टर में भी इंडियन नेवी की मौजूदगी है। नौसेना के खास पोसाइडन-81 एयरक्राफ्ट का यूज वहां सर्विलांस के लिए हो रहा है। इन सारे डेवलपमेंट्स के बीच 5 बड़ी वजहों के चलते नेवल कमांडर्स की यह कॉन्फ्रेंस बेहद अहम हो जाती है।

### हिंद महासागर में चीन के प्लान को फेल करने की तैयारी

नेवल कमांडर्स की कॉन्फ्रेंस में चीन पर ही फोकस रहने की संभावना है। नेवी ने जिस तरह से हिंद महासागर में सर्विलांस बढ़ाया है, उससे साफ इशारा मिलता है कि उसे चीन के मंसूबों का अंदाजा है। चीन ने जिस तरह से दक्षिण चीन सागर में अपने कब्जे को बढ़ाया है, उसके बाद उसकी निगाहें इस ओर भी होंगे। ग्लोबल पावर बनने के लिए चीन को हिंद महासागर पर प्रभुत्व स्थापित करना ही होगा, मगर यहां उसका सामना भारतीय नौसेना से है जो इस इलाके में सुपरपावर है।

### चीनी दखल को कम से कम करने का बनेगा प्लान

इस कॉन्फ्रेंस में नेवल कमांडर्स नई रणनीति पर चर्चा कर सकते हैं। चीनी नौसेना ने हिंद महासागर में अपने कदम बढ़ाने के संकेत दिए हैं। ऐसे में नौसेना किस तरह से अपने ऑपरेशंस के जरिए चीनी नौसेना के मंसूबों पर पानी फेरे, इसपर कमांडर्स मीट में बात हो सकती है।

### जंगी जहाज पहले से तैयार, बस इशारे का इंतजार

नेवी ने अपने सबसे घातक जंगी जहाजों को हिंद महासागर में चीन की चुनौती के लिए तैनात किया है। दक्षिण चीन सागर में चीन का रुख देकर नौसेना पहले ही सतर्क हो गई थी। अगर चीन ने यहां अपनी दादागिरी दिखाने की कोशिश भी की तो उसे करारा जवाब मिलेगा। भारत के सर्विलांस जहाज दिन-रात हिंद महासागर में नजर रखते हैं। इसके अलावा एयरक्राफ्ट कैरियर्स भी तैनात हैं।

### मालाबार एक्सरसाइज पर भी होगी बात

मालाबार में नेवल एक्सरसाइज पर भी कमांडर्स मीटिंग में बात होगी। इस साल ऑस्ट्रेलिया भी इस युद्धाभ्यास में शामिल होने जा रहा है। अमेरिका और जापान तो पहले से ही हैं। यह चारों देश चीन के खिलाफ मोर्चा खोलते हुए हैं, ऐसे में चीन का एक गलत कदम उसे बर्बादी की राह पर मोड़ सकता है।

### देसी पर है सरकार का जोर

यह कॉन्फ्रेंस ऐसे वक्त में हो रही है जब सरकार का पूरा जोर डिफेंस सेक्टर में देसी को बढ़ावा देने पर है। इस सेक्टर में आत्मनिर्भर होने का मतलब है कि चीन की हिम्मत नहीं होगी भारत की तरफ आंख उठाने की। भारत ने

जिन 101 आइटम्स का इम्पोर्ट रोका है उसमें नेवी के हथियारों से लेकर परंपरागत पनडुब्बियां तक शामिल हैं। इसके अलावा क्रूज मिसाइलें भी अब भारत में बनेंगी। सरकार का जो प्लान है, उसके हिसाब से नेवी को 'मेक इन इंडिया' के तहत अच्छी-खासी ताकत मिलने वाली है। नेवी को देश में ही अगली पीढ़ी की छह पनडुब्बियां बनानी हैं।

<https://navbharattimes.indiatimes.com/india/indian-navy-commanders-important-meet-in-new-delhi-amid-border-tensions-with-china/articleshow/77629486.cms?story=5>



Thu, 20 Aug 2020

## Bharat Forge artillery gun in final trials before sale to Indian Army

*Company developing four platforms, all 100 percent indigenous, which are in various stages of trials*

*By Swaraj Baggonkar*

One of four artillery guns developed by Bharat Forge is learnt to have reached the final stage of testing with the Indian Army.

During a recent analyst call after the announcement of the Pune-based company's June quarter financial results, a top official said that all four gun platforms developed by it are in various stages of trials.

“We have gone through four sets of trials for the first gun and three sets of trials for the second gun. Once the last phase of trials is over we are ready for the sale process to begin,” said Amit Kalyani, Deputy Managing Director, Bharat Forge.



### **Reducing import dependence**

Bharat Forge is set to benefit hugely from the reform initiative kick-started by the Ministry of Defence wherein restrictions have been imposed on import of 101 weapons and military platforms. The initiative, announced on August 9, includes artillery guns.

The towed artillery gun (155mm x 52 Calibre), which is part of the import embargo, has been developed by Bharat Forge. Called Bharat 52 and classified as an Advanced Towed Artillery Gun System (ATAGS), it is the first gun built by the Kalyani Group.

Weighing 15 tonnes, Bharat 52 has a firing range of more than 48 km and has a self-propelled ground speed of 20 km per hour. It can fire six rounds in 30 seconds.

ATAGS is considered to be one of the most advanced field artillery systems in the world but India is yet to induct them. In 2016 India ordered 145 howitzers (also an artillery gun) from the US for \$750 million. The 155mm x 39 calibre ultra-light howitzers have a range of 24-39 km, which is much lower than the Bharat 52 ATAGS.

With the private sector being allowed to take part in defence production, Indian companies have been keen participants. In 2018, Mahindra Defence tied up with US-based BAE Systems to manufacture M777 howitzers.

Ashok Leyland is engaged in making Field Artillery Tractors, which are also in the 101 restricted items.

### **Fully local**

“All the products that we are making are 100 percent local — they are 100 percent designed, engineered and developed locally. Three artillery guns are in advanced stages of testing. One is in

the final stage of testing — it has gone through all the tests; it is the user test which is now going on this month,” Kalyani added.

The Indian Army is reportedly looking to procure about 150 ATAGS. Depending on the add-ons and the level of technology, each ATAGS can be priced up to Rs 15 crore, said Kalyani.

“The products that we have focussed on, all of them are meant for domestic manufacturing. And in certain products such as artillery guns, it is very clear that there is nobody as competitive as us either in technology or on an overall basis, so we are looking forward to the conclusion of our final trials,” he added.

### **Three-horizon strategy**

Bharat Forge is following what it calls a three-horizon strategy. Horizon One has products such as artillery guns, some armoured vehicles, and some speciality vehicles. Horizon Two also has specialty vehicles. Horizon Three has electronics and high-end technology.

“Now, based on the announcements, we will deepen our capability within these product segments and add strength in areas that we need. But I do not think we are going to go into newer areas like building ships” said Kalyani.

Bharat Forge is also looking for markets outside India for its military hardware. But, with riders. “Selling defence items to a responsible nation like India is easy. Now, there are many countries that buy weapons where we do not know what they do with it. India has never been an aggressor anywhere, so I want to sell to places where it is safe to sell and where it is advisable to sell.” said Kalyani.

<https://www.moneycontrol.com/news/technology/auto/bharat-forge-artillery-gun-in-final-trials-before-sale-to-indian-army-5725541.html>



*Thu, 20 Aug 2020*

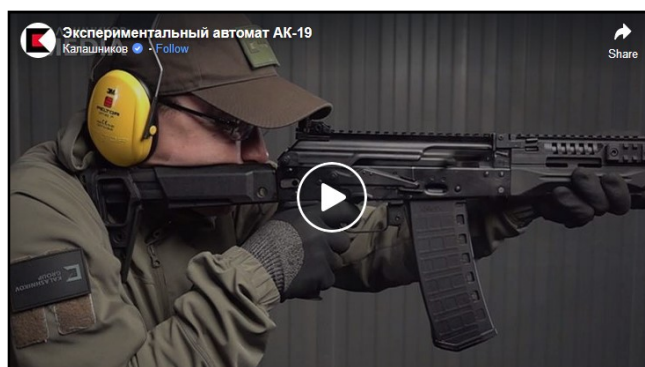
## **While Indian Army eyes AK-203, Kalashnikov group unveils its latest AK-19 Rifles**

Russian defense manufacturer Kalashnikov Group has unveiled its latest rifle under the AK series – the AK-19. The first version of the gun, the AK-47, was used by the Red Army of the Soviet Union from 1949.

The rifle is based on the AK-12 platform, featuring the same design and ergonomics. The rifle’s distinct feature is being chambered in .223 NATO (5.56x45mm) – a round used by most modern militaries in the world.

The AK-19’s barrel length is 415 millimeters, and its weight is 3.350 grams.

The rifle features the same full-length Picatinny rail across the top cover, much like the AK-12, and was shown with reportedly a new rear peep sight, which can be seen in a video released by Kalashnikov Concern on its Facebook and Instagram handle.



According to the post, the rifle’s barrel length is 415mm, compared to 386mm of its obvious-rival M4 carbine. The gun is due to be presented at the Army-2020 International Military-Technical Forum from August 23-29, at the Patriot Park, Moscow.

The twist rate is specified to be 1:7 inches, common for the modern 5.56x45mm chambered rifles. Strikingly, the stock shown in the video is much different from the telescopic stock generally shown on the AK-12 – which the company has claimed to be improved over previous models.

The company also stated that the rifle has improved ergonomics and a new muzzle device which can allow mounting quick-attach suppressors. The magazines too, are similar new polymer-built with windows denoting the number of rounds left.

Kalashnikov Concern has made several iterations of the AK-12 platform, distinctively having the front sight combined with the gas block- which was derived from the development of the AK-100 series.

Primary iterations include the AK-15 (the 7.62x39mm variant), the RPK-16 (LMG variant), and the AK-308, a rifle which was made prospectively for the orders from the Indian Army following its request for .308 NATO rifles, and other buyers along with the civilian market.

The Indian Army recently finalized AK-203 to equip its soldiers replacing the INSAS rifles. Following the Make In India initiative by Modi-government, Kalashnikov has agreed to set up a factory in the city of Amethi, and the deal is expected to be inked during the visit of Russian President Vladimir Putin to India in October.

<https://eurasianimes.com/while-indian-army-set-to-acquire-ak-203-kalashnikov-group-unveils-its-latest-ak-19-rifle/>



Thu, 20 Aug 2020

## Why has India opted for indigenous LCH Helicopters over AH-64E Apache to fight China?

*Developed by Hindustan Aeronautics Limited (HAL), IAF has ordered 30 more LCH. “It is the lightest attack helicopter in the world, designed and developed by HAL to meet the specific and unique requirements of the Indian Armed Forces, reflecting the crucial role of HAL in Atmanirbhar Bharat*

India’s choice of attack helicopters in the mountainous Himalayas is indigenous Light Combat Helicopters (LCH) over its new US-made AH-64E Apache. The Indian Air Force (IAF) has deployed two LCH in Ladakh amidst the ongoing standoff between India and China.

Developed by state-owned Hindustan Aeronautics Limited (HAL), IAF has ordered 30 more LCH. “It is the lightest attack helicopter in the world, designed and developed by HAL to meet the specific and unique requirements of the Indian Armed Forces, reflecting the crucial role of HAL in Atmanirbhar Bharat,” said R Madhavan, Chief of Media Communications, HAL.

“LCH is a potent weapon platform because of its state-of-the-art systems and highly accurate weapons that are capable of hitting any type of target by day or night,” said a HAL press release.

“The other features of LCH include its ability to operate in the complete ‘Area of Responsibility’ (AOR) and altitudes. It has the capability to carry adequate weapon load at high altitudes under varied conditions. All these characteristics make it most suitable for hot and high altitude operations.”

Meanwhile, India also possesses another attack helicopter: the U.S. AH-64E Apache which is considered the most advanced and deadly attack helicopter in the world. As part of a 2015 deal



HAL Light Combat Helicopters (LCH). Via Wikipedia

worth \$3 billion, India recently received 22 Apaches along with 17 CH-47 Chinook helicopters from the US.

Apache has Hellfire anti-tank missiles and Longbow fire control radar. The Indian AH-64E Guardian version features a more powerful engine, better data networking, and improved composite rotor blades. Compared to the LCH, the Apache is faster, has more engine power, and carries far more weapons, though the LCH has a longer range.

However, the IAF has chosen LCH over Apache due to its ability to perform at high altitudes, which can be a challenge for rotary-wing aircraft. The Ladakh region in the Himalayas, where India and China are engaged in a military standoff, has an altitude between 10,000 – 18,000 feet.

LCH has proven its might in 2015 when several test landings were conducted on the Siachen glacier in Ladakh, at altitudes up to 15,800 feet while carrying a modest 500-kilogram load. While the AH-64E can fly up to 20,000 feet, experts have argued that the LCH is more suitable for the Himalayas.

“While the Apaches would do well in the plains, they would have limitations operating in the upper reaches of the Himalayas,” wrote Fali H Major (Retd.), Former Indian Air Chief Marshal “During the Kargil War of 1999, there was a need felt for armed attack helicopters capable of operating at high altitude.

That’s where the LCH fits in. It has successfully been tested in altitudes over 13,000 feet and was the first attack helicopter to land at the forward landing base in Siachen.”

However, there is a tradeoff between the capabilities of the two attack helicopters viz-a-viz the armament. While AH-64 can fly with 30 millimeter cannon and up to 16 Hellfire missiles and Hydra 70-millimeter unguided rockets, LCH is lightly armed with 20-millimeter cannon and up to four missiles or rockets.

Even with such a disadvantage, LCH makes for a better choice in the mountainous regions as it is more important to have an armed helicopter that can fly above the mountains instead of destructive ones which may not stand the challenging terrain and weather conditions.

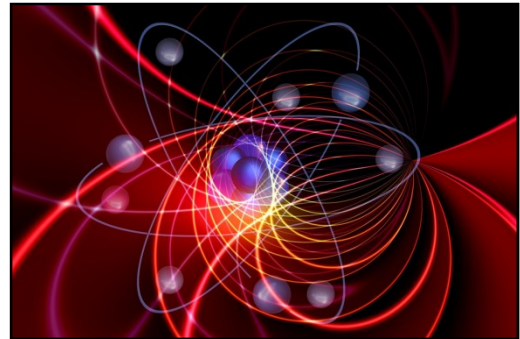
<https://eurasianimes.com/why-has-india-opted-for-indigenous-lch-helicopters-over-ah-64e-apache-to-fight-china/>

Thu, 20 Aug 2020

## Controlling the electron spin: Flip it quickly but carefully

Over the past two decades, a new area at the interface of semiconductor physics, electronics and quantum mechanics has been gaining popularity among theoretical physicists and experimenters. This new field is called spintronics, and one of its main tasks is to learn how to control the spin of charge carriers in well known semiconductor structures. Many theoretical efforts are always required before some idea finds its embodiment in an actual device, and so far theoretical work on spintronics has been outweighing experimental research.

Denis Khomitsky, Associate Professor of Theoretical Physics Department at Lobachevsky University together with postgraduate student Ekaterina Lavrukina in collaboration with Professor Evgeny Sherman from the University of the Basque Country in Bilbao (Spain) have proposed a new model that describes electron spin behavior in a semiconductor nanowire with a deep quantum dot (an area where electron movement is confined by electrodes), where spin behavior can be controlled by means of a periodic electric field.



Credit: Pixabay/CC0 Public Domain

It is known that in materials with strong spin-orbital interactions it is possible to control the electron spin without switching the magnetic field. Instead, the control can be achieved by applying a periodic electric field at a specially selected frequency.

This phenomenon, called electric dipole spin resonance, has been known for quite some time, but its practical application is still limited and there is a need for such technology.

"In the proposed model, we have elucidated the role of the continuum states with energies 'above' the quantum dot, to which the electron will inevitably make its way or tunnel under the action of a sufficiently strong field in the process of resonance. It turns out that to accelerate the spin flip, which is very desirable in electronics and spintronics, there is no need to have very strong electric fields, because in such fields the electron tunnels into the continuum too quickly, and the projection of its spin begins to fade with time, taking away valuable information," says Denis Khomitsky who is in charge of this research project at Lobachevsky University.

Hence, a practically important conclusion: it is necessary to choose an optimum interval of control fields in such structures, which will make it possible to flip the electron spin quickly and "carefully" enough not to lose the valuable information.

The work is published in *Physical Review Applied*.

<https://phys.org/news/2020-08-electron-flip-quickly-carefully.html>



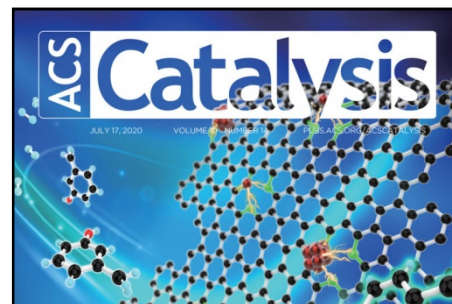
# A key to cheaper renewable fuels: Keeping iron from rusting

By Tina Hilding

Washington State University researchers have made a key first step in economically converting plant materials to fuels: keeping iron from rusting.

The researchers have determined how to keep iron from rusting in important chemical reactions that are needed to convert plant materials to fuels, meaning that the cheap and readily available element could be used for cost-effective biofuels conversion.

Led by Yong Wang, Voiland Distinguished Professor in the Gene and Linda Voiland School of Chemical Engineering and Bioengineering, and Shuai Wang from the State Key Laboratory for Physical Chemistry of Solid Surfaces at Xiamen University, the researchers report on their work on the cover of the July issue of *ACS Catalysis*.



Credit: ACS Catalysis

Researchers have been trying to find more efficient ways to create fuels and chemicals from renewable plant-based resources, such as from algae, crop waste, or forest residuals. But, these bio-based fuels tend to be more expensive with less energy density than fossil fuels.

One big hurdle in using plant-based feedstocks for fuel is that oxygen has to be removed from them before they can be used.

"You want to use the cheapest catalyst to remove the oxygen," said Jean-Sabin McEwen, a co-author on the paper and associate professor in the Gene and Linda Voiland School of Chemical Engineering and Bioengineering. "Iron is a good choice because it's super abundant."

Iron-based catalysts show great promise for being able to remove oxygen, but because the plant materials also contain oxygen, the iron oxidizes, or rusts, during the reaction, and then the reaction stops working. The trick is to get the iron to remove the oxygen from the plants without taking up so much oxygen that the reaction stops.

In their work, the researchers anchored their iron catalyst with a carbon structure that was modified to incorporate nitrogen. The structure modifies the properties of the iron, so that it interacts less with oxygen while it continues to do the required work of removing oxygen from the plant material. The researchers used the nitrogen as a sort of control dial to tune the iron's interaction with oxygen.

In another recently published paper in *Chemical Science* led by Yong Wang and Junming Sun, a research assistant professor in the Gene and Linda Voiland School of Chemical Engineering and Bioengineering, the researchers discovered a durable iron-based catalyst with a thin carbon graphene layer around it. The graphene layer protected the iron while cesium ions allowed the researchers to tailor its electronic properties for the desired reaction.

"We dialed down the oxygen reaction," Sun said. "By protecting iron and tuning its properties, these works provide the scientific basis for using earth abundant and cost-effective iron as catalysts for biomass conversion."

The researchers are now working to better understand the chemistry of the reactions, so they can further increase the reactivity of the iron catalysts. They also will need to try their catalysts with real feedstocks instead of the model compounds used for the study. The feedstocks collected from farm fields will be more complicated in their compositions with a lot of impurities, and the

researchers would also have to integrate their catalyst into a series of steps that are used in the conversion process.

"We are trying to make the conversion as economically as possible," Wang said. "The key is trying to find robust catalysts based on low-cost, earth abundant elements. This is a first step in that direction."

**More information:** Yanling Yang et al, Controlling the Oxidation State of Fe-Based Catalysts through Nitrogen Doping toward the Hydrodeoxygenation of m-Cresol, *ACS Catalysis* (2020). DOI: [10.1021/acscatal.0c00626](https://doi.org/10.1021/acscatal.0c00626)

Jianghao Zhang et al. Surface engineering of earth-abundant Fe catalysts for selective hydrodeoxygenation of phenolics in liquid phase, *Chemical Science* (2020). DOI: [10.1039/D0SC00983K](https://doi.org/10.1039/D0SC00983K)

**Journal information:** [ACS Catalysis](https://doi.org/10.1021/acscatal.0c00626) , [Chemical Science](https://doi.org/10.1039/D0SC00983K)  
<https://phys.org/news/2020-08-key-cheaper-renewable-fuels-iron.html>



Thu, 20 Aug 2020

## Researchers work to ensure accurate decoding in fragile quantum states

When computers share information with one another, the information gets encoded into bits, then decoded back into its original form. In the process, pieces of the information sometimes get scrambled, or lost. As a simplified example, an improperly decoded email that says "I am now sending you the money" could arrive at its destination saying "I am not sending you the money."

Another example: When you save a document on your computer, you expect it to hold the same information when you reopen it. And, if you ask a computer to solve the equation  $2+2$ , you need to trust it will spit out 4. This is even more important for complex equations that you can't calculate yourself, like the values for  $x$ ,  $y$  and  $z$  in the Diophantine equation  $x^3 + y^3 + z^3 = 42$ .

Bane Vasic, a professor of electrical and computer engineering and director of the Error Correction Laboratory in the University of Arizona College of Engineering, specializes in error correction codes, which ensure that the information shared and calculated by computers is properly decoded before arriving at its destination. He also studies fault tolerance, or the ability of a computer or network of computers to continue functioning when one or more of its components fails.



University of Arizona team advances quantum error correction codes. Credit: University of Arizona

Vasic has been instrumental in developing a class of error correction codes—called low-density parity check codes, or LDPC codes—used widely in classical communications and data storage. In a project funded by \$1.1 million from the National Science Foundation, Vasic is partnering with Saikat Guha in the James C. Wyant College of Optical Sciences to test the feasibility of quantum LDPC codes in quantum computers for the first time.

### Applying a Classical Technique to Quantum Networks

While  $x^3 + y^3 + z^3 = 42$  is a complex equation, it is possible to solve for  $x$ ,  $y$  and  $z$  with classical computing. In fact, in 2019 a group of scientists used a network of classical computers to do just that. It took more than a million hours of calculation. Quantum computing has the potential to solve equations like this one in just seconds.

"Through quantum computing, we will be able to analyze very complicated phenomena, and to solve problems that are not solvable by classical computers. And this will be done very fast," Vasic

said. "There are applications in biology; medicine; finances; the simulation of physical, chemical and biological systems; the discovery of new materials; and the design of molecules."

How is this possible? Classical computing stores information in units called bits, which exist as either 0s or 1s. Quantum computing uses units called qubits, which can exist in multiple states simultaneously. The superposition of states is what allows for ultra-speedy, futuristic computing. However, as qubits are physically realized as subatomic particles, this state is very fragile to create and maintain, making qubits more prone to error, or decoherence, than bits.

Theoretical physicists now speculate that qubits are also what make up space-time, or the fabric of the universe. And recent research has indicated that quantum error correction explains why space-time is so robust, despite its fragile building blocks.

In fact, qubits are so sensitive that the very act of measuring them can cause change. Presently, quantum error correction involves first carefully observing the qubits and recording findings as classical information. Then, a classical computer calculates what is wrong, and scientists transfer the error correction information to the quantum system.

"In this project, we are investigating methods where we don't leave the quantum world, so all of the operations will also be quantum," Vasic said. "We want to explore whether decoding can be done by processing quantum information."

### **Passing Messages to Mitigate Noise**

Today's computers are made up of billions of basic building blocks called logic gates. These gates apply different operations to binary information being processed. For example, one of the simplest kinds of gates is a NOT gate, which transforms bits into their opposites by intaking 0s and outputting 1s and vice versa. However, sometimes signal interference and noise cause gates to make mistakes, which leads to incorrect results. Quantum gates perform more versatile and exotic operations than their classical relatives do, but are noisier and more prone to error.

Error correcting codes entangle qubits in a very specific way so that qubits stabilize each other. Vasic's decoders allow qubits to pass information about one another back and forth. Similar message passing algorithms are used in artificial intelligence. None of the individual bits have a complete knowledge of value of other bits, but together—through message passing—they collectively learn if there are errors and exactly which bits they are located in. This new project focuses on developing a quantum version of such artificial intelligence algorithms.

"The biggest advantage of LDPC codes is that they support these kinds of message-passing algorithms, which are fault tolerant," Vasic said. "In quantum systems, we have to have fault tolerance, because, due to the higher level of noise, quantum gates are orders of magnitude noisier and more unreliable than classical logic gates."

Vasic and several other engineering faculty members are also part of the newly created Center for Quantum Networks, a five-year, \$26 million NSF Engineering Research Center led by the University of Arizona. The center, directed by Guha, aims to lay the foundations for the quantum internet, and error correction represents a critical piece of the venture.

"This is a missing piece to realize quantum computers and networks," Vasic said. "These quantum LDPC codes are the next generation of codes that will be used, but we have to develop algorithms to decode efficiently and fault-tolerantly."

"With the recent hiring of several new faculty members specializing in quantum engineering, the college and university are positioning themselves at the forefront of this field," said David W. Hahn, Craig M. Berge dean of the College of Engineering. "We are fortunate to have researchers like Dr. Vasic bring their experience and invaluable expertise to the table."

<https://phys.org/news/2020-08-accurate-decoding-fragile-quantum-states.html>

## Cryo-EM study yields new clues to chicken pox infection

By Nathan Collins

Despite decades of study, exactly how herpesviruses invade our cells remains something of a mystery. Now researchers studying one herpesvirus, the varicella zoster virus (VZV) that causes chicken pox, may have found an important clue: A key protein the virus uses to initiate infection does not operate as previously thought, researchers at Stanford University and the Department of Energy's SLAC National Accelerator Laboratory report August 18 in *Nature Communications*.

The results were made possible by high-resolution cryo-electron microscopy (cryo-EM), which showed that the immune system can prevent infection by attacking a spot on the protein in an unexpected place, said Stefan Oliver, a senior research scientist in pediatrics at Stanford and the new study's first author.

Herpesviruses including VZV—along with HIV, coronaviruses, and a number of other virus families—are enclosed in a protective membrane, and the first step in the process of invading a cell is for the viral envelope to fuse with the cell's membrane. In VZV's case, a protein called gB that sits on the outside of the viral envelope uses a set of molecular fingers to grab onto and fuse with cells.

But it turns out that's only part of the story. To investigate what was happening in more detail, Oliver and colleagues used an antibody from a patient that prevented VZV fusion with cells in cryo-EM experiments to discover where the antibody attacks gB.

To Oliver and colleagues' surprise, the antibody bound to a spot on gB far from the fusion fingers, indicating that it may not need to target the fingers to prevent fusion with a cell. This result suggests that there may be more involved in the process of fusion, which causes infection, than was realized.

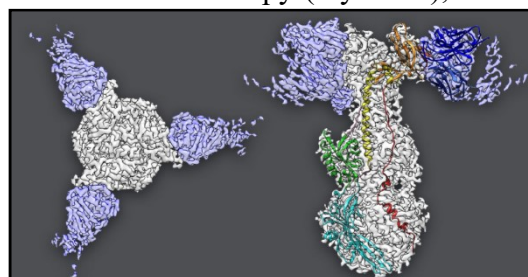
Figuring out exactly how the fusion process works will take further studies that could inform the design of treatments and vaccines for other herpesviruses, Oliver said, since they also rely on gB to infect cells. "Vaccines are currently not available for herpesviruses, with the exception of the one that prevents VZV, so the development of vaccines that target this newly identified region of gB has the potential to solve an important medical need."

Oliver added, "It was only possible to uncover this mechanism by generating one of the highest resolution structures of a viral protein-antibody pair using cryo-EM. Without the cryo-EM capabilities at SLAC these fascinating insights into the molecular mechanisms of fusion function would not have been achievable".

**More information:** Stefan L. Oliver et al, A glycoprotein B-neutralizing antibody structure at 2.8 Å uncovers a critical domain for herpesvirus fusion initiation, *Nature Communications* (2020). [DOI: 10.1038/s41467-020-17911-0](https://doi.org/10.1038/s41467-020-17911-0)

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

<https://phys.org/news/2020-08-cryo-em-yields-clues-chicken-pox.html>



Images extracted from cryo-EM data (left and right panels) show the varicella zoster virus's gB protein with three antibodies attached at the ends. Different views of the protein and antibodies together were used to reconstruct their molecular structure to nearly atomic resolution. Credit: Greg Stewart/SLAC National Accelerator Laboratory

## Study finds clues to aging in 'junk' DNA

By Hannah Halusker

For decades, greater than 60% of the human genome was believed to be "junk DNA" that served little or no purpose in the course of human development. Recent research by Colorado State University is challenging this notion to show that junk DNA might be important after all.

A new study, published on June 5 in *Aging Cell*, found that a portion of noncoding genetic material, called repetitive element transcripts, might be an important biomarker of the aging process.

Tom LaRocca, an assistant professor in the Department of Health and Exercise Science and faculty member in the Columbine Health Systems Center for Healthy Aging at CSU, led the study to investigate a growing body of evidence that repetitive elements—transposons and other sequences that occur in multiple copies in the human genome—may become active over time as we age.

LaRocca, graduate student Alyssa Cavalier, and postdoctoral researcher Devin Wahl centered specifically on RNA transcripts, molecules that are transcribed from the DNA of repetitive elements, to test whether they increase in number with age.

"The biomarker angle is important here," LaRocca said. "Ten to 20 years from now, we might be able to take samples or certain measurements from people in the doctor's office and get some insight into what's going on with them biologically, so that we can know how to best treat them and maximize their healthspan. If these repetitive element RNAs are a biomarker of aging, then maybe someday you can get a measurement like this done to see how your repetitive elements are being expressed. Are there too many of them? Is that a problem?"

### Mapping RNA

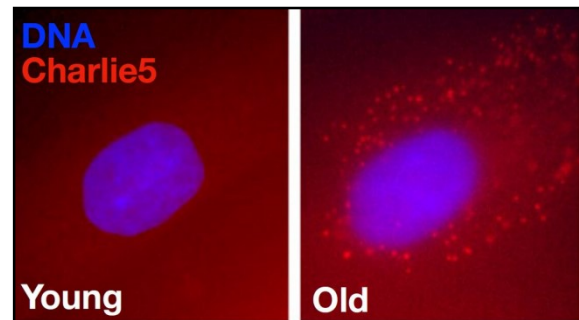
To carry out the study, the researchers began by analyzing an existing RNA sequencing dataset gathered from skin cells in healthy human subjects aged 1-94 years old. Just as the Human Genome Project of the 1990s sought to sequence and map the approximately 20,500 genes in human DNA, RNA sequencing can provide a map of the entire transcriptome in the cells under study. From that analysis, which was all computational, the researchers found that transcripts from most major types of repetitive elements were increased in older subjects.

In a second wave of study, the researchers verified their initial findings by performing their own lab analyses on skin cells from a biobank. Using fluorescent microscopy, the researchers tagged the transcript of a specific transposon, Charlie5, to see how it fluctuates with the age of cells: the brighter the tag appears under the microscope, the more Charlie5 transcript is detectable.

As hypothesized, skin cells from older adults revealed a marked accumulation of Charlie5 transcript compared to cells from younger individuals, showing that repetitive element RNAs appear to accumulate with age.

While an important observation, the grander outcome of this study is that repetitive RNA transcripts might be linked with biological age, or the health of a person's cells, as opposed to chronological age in years.

"If you find something that changes progressively with aging, that finding alone is not necessarily interesting, because lots of things increase or decrease with age. What you really want



Fluorescence microscopy images of the Charlie5 transcript in young versus old human skin cells. Credit: *Aging Cell*

to find is something that reflects biological aging," LaRocca said. "For example, let's say you're a smoker and you're under a lot of chronic stress. Then, perhaps even if you're only 45, your biological age—the health of your cells—could actually be 60 or 65. We think that repetitive element transcripts could be a marker of this."

### **Link to aging**

To study biological age, Cavalier performed an analysis that compared sun-exposed skin cells to skin cells that had not been exposed to sunlight—the theory being that the more damaging UV rays a skin cell is exposed to, the older the cell will be biologically. Consistent with her hypothesis, Cavalier noted higher levels of repetitive element RNAs in the sun-exposed cells.

A link between repetitive element transcripts and biological age was further confirmed by studying skin cells from patients with Hutchinson-Gilford progeria syndrome (HGPS), a premature aging syndrome, and by studying an RNA-sequencing dataset from the roundworm *Caenorhabditis elegans*.

Why might repetitive element transcripts increase with age? The researchers suspect that chromatin—the complex of DNA and protein in cells that typically represses repetitive elements from being expressed—might become disrupted, allowing for the transcription of repetitive elements.

All in all, for a portion of the genome that scientists used to ignore, evidence is growing that noncoding RNAs and repetitive elements play vital roles in regulating the rest of the human genome, and in this case, as potentially targetable biomarkers of aging.

"This is a really big chunk of the genome that, for the longest time, no one really knew what it did, so they just kind of assumed it was junk. But we're finding more and more that these noncoding regions might not only be doing something, but they might have actual health implications," Cavalier said.

Future studies in LaRocca's Healthspan Biology Lab will compare chromatin structure in people who exercise routinely with those who don't to understand how exercise impacts repetitive element levels. Other studies will investigate the possibility of using a drug to inhibit repetitive element RNAs from being transcribed.

**More information:** Thomas J. LaRocca et al. Repetitive elements as a transcriptomic marker of aging: Evidence in multiple datasets and models, *Aging Cell* (2020). DOI: [10.1111/acer.13167](https://doi.org/10.1111/acer.13167)

**Journal information:** [Aging Cell](https://doi.org/10.1111/acer.13167)

<https://phys.org/news/2020-08-clues-aging-junk-dna.html>



Thu, 20 Aug 2020

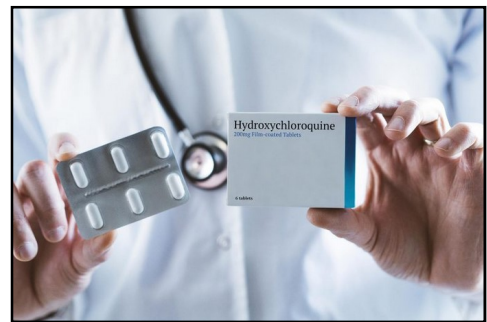
## New research finds hydroxychloroquine is not a possible defense against covid-19

### *Hydroxychloroquine (HCQ) ineffective as a preventive antiviral against COVID-19*

Researchers at Case Western Reserve University have added to the growing body of understanding about how hydroxychloroquine (HCQ) is not a possible defense against COVID-19.

Specifically, they found that HCQ is not effective in preventing COVID-19 in patients with lupus and rheumatoid arthritis (RA), suggesting a broader interpretation of HCQ as ineffective preventive medicine for the general population. Their findings were recently published in the *Annals of the Rheumatic Diseases*.

Many researchers have focused on patients with systemic lupus erythematosus (SLE) and RA because HCQ is frequently taken by these patients. Anecdotal reports in the early stages of the pandemic showed these patients were not getting COVID-19. Earlier researchers then explored HCQ in the lab and found it effective against the virus, in addition to its already established anti-inflammatory properties, so testing in people for prevention or treatment at first held some promise. Since those early tests, various more recent studies have shown that HCQ is not effective in treating moderate-to-severe hospitalized cases. Treatment with HCQ early in the disease or for mild cases is still under review.



“Our study shows, with a large degree of confidence, that HCQ is ineffective as a preventive antiviral in people with SLE and/or RA taking drugs that suppress their immune system, putting them at greater risk,” said Mendel Singer, PhD, MPH, lead author and associate professor and vice chair for education in the Department of Population & Quantitative Health Sciences at the Case Western Reserve School of Medicine. “Given how the study was structured, one can make an educated extension that it is not effective in preventing COVID-19 in people without those conditions. It is not uncommon for something to show promise in the lab, and then prove ineffective in the more complex biological landscape of humans.”

The Case Western Reserve team drew on a large national database, pulling de-identified patient data from 36 health systems, to compile a much larger study than previous work, looking at patients with SLE and/or RA and their health outcomes related to their use of HCQ. Prior studies had fewer than 20 COVID-19 patients with SLE and/or RA; this study had 159. This study showed that patients with SLE and/or RA who contracted COVID-19 were just as likely to be taking HCQ as SLE and/or RA patients who did not get COVID-19.

“By drawing on data from a relatively large patient population with lupus and/or RA, we can offer a higher level of confidence in our findings,” said Singer. “We see from this large retrospective review that this drug is ineffective in preventing COVID-19 in these patients who have been taking HCQ. If HCQ were effective in prevention, we would have seen fewer HCQ-taking SLE/RA patients with COVID-19, but did not. This likely means that HCQ is not active against the SARS-CoV-2 virus in humans — versus in the lab — and is unlikely to be an effective preventive antiviral for anyone.”

Reference: “Response to: ‘Hydroxychloroquine ineffective for COVID-19 prophylaxis in lupus and rheumatoid arthritis’ by Singer et al” by Manuel Francisco Ugarte-Gil, Maximilian F Konig, Peter Korsten, Francis Berenbaum, Alfred Hyoungju Kim and Jeffrey A Sparks, 5 August 2020, *Annals of the Rheumatic Diseases*.

[DOI: 10.1136/annrheumdis-2020-218683](https://doi.org/10.1136/annrheumdis-2020-218683)

Singer was joined in this study by David Kaelber, MD, PhD, MPH, professor of internal medicine, pediatrics, and population and quantitative health sciences and co-director of the Center for Education and Training in Health Informatics at the School of Medicine and chief medical informatics officer at The MetroHealth System; and Maria Antonelli, MD, assistant professor of medicine at the School of Medicine and a rheumatologist at The MetroHealth System. The TriNetX Research Network, a federated health-research network that aggregates blinded electronic health records from 36 U.S. health-care organizations, provided the patient data.

<https://scitechdaily.com/new-research-finds-hydroxychloroquine-is-not-a-possible-defense-against-covid-19/>

# hindustantimes

Thu, 20 Aug 2020

## Mild Covid-19 cases can produce strong T cell response: Study

*According to the research, published in the journal Cell, there is limited evidence of reinfection in humans with previously documented Covid-19*

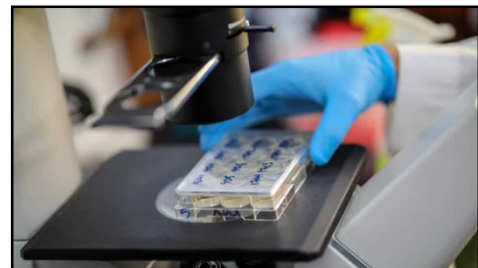
London: Mild cases of Covid-19 can trigger the immune system’s memory T cells even in the absence of detectable virus-specific antibodies, according to a study which says the response may play a significant role in preventing reinfection with the novel coronavirus.

According to the research, published in the journal *Cell*, there is limited evidence of reinfection in humans with previously documented Covid-19.

“In the absence of a protective vaccine, it is critical to determine if exposed or infected people, especially those with asymptomatic or very mild forms of the disease who likely act inadvertently as the major transmitters, develop robust adaptive immune responses against SARS-CoV-2,” said study senior author Marcus Buggert of the Karolinska Institutet in Sweden.

The study noted that most published research on immune protection against the novel coronavirus SARS-CoV-2 focus on the induction of neutralising antibodies which block the virus and prevent it from entering cells. However, the scientists, including those from Karolinska Institutet, said antibody responses tend to wane, and are not detectable in all patients, especially those with less severe forms of Covid-19. Based on research in mice, they said vaccine-induced memory T cell responses, which can persist for many years, protect against the related 2002-03 SARS pandemic virus even in the absence of detectable antibodies. According to the current study, it was not clear until now how SARS-CoV-2-specific T cell responses relate to antibody responses or to the clinical course of Covid-19 in humans.

To address this gap in knowledge, Buggert and his team assessed SARS-CoV-2-specific T cell and antibody responses in more than 200 individuals from Sweden across the full spectrum of exposure, infection, and disease. They said during the acute phase of infection, the T cell responses were associated with various clinical markers of disease severity. The study found that after recovery from Covid-19, SARS-CoV-2-specific memory T cells were triggered, with the strongest response present in individuals who recovered from severe Covid-19. Meanwhile, the researchers



A scientist holds cells that produce antibodies against the coronavirus disease. (REUTERS)



said, progressively lower T cell responses were observed in individuals who recovered from very mild Covid-19 and family members exposed to the virus.

All 23 individuals, assessed as part of the study, who recovered from severe Covid-19, developed both SARS-CoV-2-specific antibody and T cell responses. But the scientists added that SARS-CoV-2-specific memory T cell responses were detected months after infection in exposed family members and in most individuals with a history of very mild Covid-19, sometimes even in the absence of SARS-CoV-2-specific antibodies. According to the study, of the 28 exposed family members, only 17 had detectable antibody responses, whereas nearly all (26/28) showed T cell responses. Among the 31 individuals who recovered from mild Covid-19, the scientists said almost all had detectable antibody responses (27/31) and developed T cell responses (30/31).

“Our findings suggest that the reliance on antibody responses may underestimate the extent of population-level immunity against SARS-CoV-2,” Buggert said. “The obvious next step is to determine whether robust memory T cell responses in the absence of detectable antibodies can protect against Covid-19 in the long-term,” he added.

<https://www.hindustantimes.com/science/mild-covid-19-cases-can-produce-strong-t-cell-response-study/story-rsN9FrVbPVcBV75fTi48SN.html>

## DECCAN Chronicle

Thu, 20 Aug 2020

### New study says flushing public urinals can spread COVID-19 virus

**Scientists from Yangzhou University say masks should be made mandatory in public washrooms**

Beijing: A new Chinese study of the COVID-19 coronavirus has found that it can potentially be transmitted by the cloud of aerosol triggered when a public urinal is flushed.

The study, published in the journal *Physics of Fluids*, says wearing a mask should be mandatory even in public washrooms.

Earlier studies have shown that the COVID-19 virus can be transmitted by feces and urine.

Scientists from Yangzhou University in China simulated and tracked virus-laden particle movements when urinals are flushed. "We used a method of computational fluid dynamics to model the particle movement that occurs with the act of flushing," said the study's co-author Xiangdong Liu.

According to the researchers, flushing a urinal involves an interaction between gas and liquid interfaces, resulting in a large spread of aerosol particles released from the urinal.

The simulations performed by the scientists revealed that the trajectory of the tiny particles ejected by flushing a urinal "manifests an external spread type, with more than 57 per cent of the particles travelling away from the urinal."

They said when men use urinals within a public restroom, these tiny particles can reach their thigh within 5.5 seconds when compared to the toilet flush, which takes 35 seconds to reach slightly higher.

However, according to Liu, particles from urinals "show a more violent climbing tendency. The climbing speed is much faster than toilet flushing."

Since urinals are used more frequently within densely populated areas, the researchers pointed out that particles will travel faster and farther, posing a serious public health challenge.



Scientists from Yangzhou University say public urinals in densely populated areas can be a serious public health challenge. (File photo)

The study underscored the importance of wearing a mask in public places, especially in restrooms.

"From our work, it can be inferred that urinal flushing indeed promotes the spread of bacteria and viruses," Liu said.

"Wearing a mask should be mandatory within public restrooms during the pandemic, and anti-diffusion improvements are urgently needed to prevent the spread of COVID-19," he added.

<https://www.deccanchronicle.com/science/science/190820/new-study-says-flushing-public-urinals-can-spread-covid-19-virus.html>



Thu, 20 Aug 2020

## Dr. Reddy's launches Favipiravir in India for COVID-19 treatment

*Avigan comes in a complete therapy pack of 122 tablets with a two-year shelf life*

Dr. Reddy's Laboratories Ltd. On Wednesday announced the launch of Avigan (Favipiravir) 200 mg tablets in India.

The launch is part of the global licensing agreement with Fujifilm Toyama Chemical Co. Ltd. that grants the Indian drug maker the exclusive rights to manufacture, sell and distribute the tablets in India, Chief Executive Officer of Branded Markets (India and Emerging Markets), Dr. Reddy's Laboratories, M.V. Ramana said.

Avigan (Favipiravir) has been approved by the Drugs Controller General of India (DCGI) for the treatment of patients with mild to moderate COVID-19 disease.

Speaking to reporters, Mr. Ramana said: "We are pleased to bring this important innovator medicine to the patients in India. The need for high quality and efficacy, affordability and better disease management are key priorities for us.

We believe that Avigan would provide an effective treatment option to the COVID-19 impacted patients in India."

Avigan comes in a complete therapy pack of 122 tablets with a two-year shelf life.

To ensure accelerated access to the medicine, Dr Reddy's has initiated a free home delivery service in 42 cities in the country, and a Helpline Center between 9 am to 9 pm IST, Monday through Saturday.

Mr. Ramana further said as of now they are importing the drug from Japan and soon will manufacture it in India.

Replying to query, he said they have already approached regulatory authorities of two or three countries including the US seeking approvals to sell the drug and seek fast track approvals from them once trials are completed.

Dr Reddy's is set to launch another COVID-19 treatment drug, Remdesivir in the first week of September, he added.

<https://www.thehindu.com/news/national/dr-reddys-launches-avigan-favipiravir-in-india-for-covid-19-treatment/article32394457.ece>

## Here's why Covid-19 patients lose sense of smell

*Researchers studying tissue removed from patients' noses during surgery believe they may have discovered the reason why so many people with COVID-19 lose their sense of smell, even when they have no other symptoms*

Washington DC: Researchers studying tissue removed from patients' noses during surgery believe they may have discovered the reason why so many people with COVID-19 lose their sense of smell, even when they have no other symptoms.

In their experiments, they found extremely high levels of angiotensin-converting enzyme II (ACE-2) only in the area of the nose responsible for smelling. This Enzyme is thought to be the 'entry point' that allows coronavirus to get into the cells of the body and cause an infection.

The researchers say their findings, published in the European Respiratory Journal, offer clues as to why COVID-19 is so infectious and suggest that targeting this part of the body could potentially offer more effective treatments.

The study was by Professor Andrew P. Lane, director of the division of rhinology and skull base surgery, and Dr Mengfei Chen, research associate, and colleagues from Johns Hopkins University School of Medicine, Baltimore, USA.

Professor Lane said: "I specialise in nasal and sinus problems, so the loss of the sense of smell in COVID-19 is of particular clinical interest to me. While other respiratory viruses generally cause loss of the sense of smell through the obstruction of airflow due to swelling of the nasal passages, this virus sometimes causes loss of smell in the absence of other nasal symptoms."

The team used tissue samples from the back of the nose of 23 patients, removed during endoscopic surgical procedures for conditions such as tumours or chronic rhinosinusitis, an inflammatory disease of the nose and sinus. They also studied biopsies from the trachea (windpipe) of seven patients. None of the patients had been diagnosed with coronavirus.

In the lab, the researchers used fluorescent dyes on the tissue samples to detect and visualise the presence of ACE2 under a microscope and compare levels of ACE2 in different cell types and parts of the nose and upper airway.

They found by far the most ACE2 on the lining cells of the olfactory epithelium, the area at the back of the nose where the body detects smells. The levels of ACE2 in these cells was between 200 and 700 times higher than other tissue in the nose and trachea, and they found similarly high levels in all the samples of the olfactory epithelium, regardless of whether the patient had been treated for chronic rhinosinusitis or another condition. ACE2 was not detected on olfactory neurons, the nerve cells that pass information about the smell to the brain.

Dr Chen said: "This technique allowed us to see that the levels of ACE2 - the COVID-19 'entry point' protein were highest in the part of the nose that enables us to smell. These results suggest that this area of the nose could be where the coronavirus is gaining entry to the body.

"The olfactory epithelium is quite an easy part of the body for a virus to reach, it's not buried away deep in our body, and the very high levels of ACE2 that we found there might explain why it's so easy to catch COVID-19."

Professor Lane added: "We are now doing more experiments in the lab to see whether the virus is indeed using these cells to access and infect the body. If that's the case, we may be able to tackle the infection with antiviral therapies delivered directly through the nose."



A health worker collects swab sample to test for coronavirus infection, at Sector 30 District Hospital, in Noida, India, on Tuesday, August 18, 2020. (Sunil Ghosh / Hindustan Times)

Tobias Welte, who was not involved in the research, is the European Respiratory Society Past President, Professor of Pulmonary Medicine, and Director of the Department of Pulmonary and Infectious Diseases at Hannover University School of Medicine, Germany. He said: “We know that many common respiratory infections, such as coughs and colds, can make us temporarily lose our sense of smell alongside a blocked nose or a sore throat. Previous research has shown that COVID-19 is unusual in that being unable to smell can be the only symptom. This is a clever study that examines why that might be the case.

“It suggests that the part of our nose responsible for smell could also be the place where the coronavirus gains a foothold in the body. This finding will need to be confirmed, but it offers possible new avenues for treating the infection.”

Other researchers who participated in this study include Wenjuan Shen, Nicholas R. Rowan Heather Kulaga, Alexander Hillel, and Murugappan Ramanathan Jr.

*(This story has been published from a wire agency feed without modifications to the text. Only the headline has been changed.)*

<https://www.hindustantimes.com/health/here-s-why-covid-19-patients-lose-sense-of-smell/story-120RLq4N9iiKSaEusFBGvM.html>

