

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: 181 04 August 2020



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

## CONTENT

S. No.	TITLE	Page No.
<b>DRDO News</b>		<b>1-4</b>
<b>COVID-19 DRDO's Contribution</b>		<b>1-2</b>
1.	BT Buzz: New mass COVID-19 tests in the making - using saliva, breath, voice, taste and smell	1
2.	In 30 seconds your voice will know whether or not there's a corona or not!	2
<b>DRDO Technology News</b>		<b>3-4</b>
3.	छोटू टैंक: चीन-भारत में तनाव के बीच रूस ने भारत को ऑफर किए 18-टन स्पिट टैंक!	3
<b>Defence News</b>		<b>5-28</b>
<b>Defence Strategic National/International</b>		<b>5-28</b>
4.	DPEPP 2020: Defence Ministry releases Policy draft to make India among leading Nations of world in defence sector	5
5.	Draft policy seeks self-reliance for India in defence production	8
6.	'Equip army with digital arsenal due to geo-politics shift'	9
7.	Draft Defence Production policy makes defence sector 'Atnmanirbhar	10
8.	India eyeing Rs 1.75 lakh crore in turnover in defence manufacturing by 2025	18
9.	Chinese Army's cyber attack unit eyeing information on India's defence and research, warn security agencies	19
10.	China's posturing in Indian Ocean to disturb stability amid Ladakh standoff: Experts	20
11.	India ramps up troop build-up at LAC; deploys T-90 tanks, heavy armour to combat Chinese aggression	21
12.	No compromise on territorial integrity: India to China during fifth round of military talks	22
13.	China's Kashgar airbase: Underground vaults hint at nuclear facilities, H-6 bombers seen since early June	24
14.	Meet Tejaswi Ranga Rao, Indian Air Force's First Woman 'Wizzo'	28
<b>Science &amp; Technology News</b>		<b>29-43</b>
15.	Drug discovery: First rational strategy to find molecular glue degraders	29
16.	Light shines on chemical production method	30
17.	Cells relax their membrane to control protein sorting	32
18.	Scientists identify new catalysts for more efficient water splitting	33
<b>COVID-19 Research News</b>		<b>35-43</b>
19.	Covid-19 vaccine tracker, August 3: Why so many vaccines are being developed	35
20.	BT Buzz: Govt slack on national vaccination plan; companies wonder how much to set aside for India!	37
21.	Oxford COVID-19 vaccine to start advanced trial in India soon. How it will work	39
22.	JSS Hospital shortlisted for COVID vaccine, drug trials	41
23.	The six strains of SARS-CoV-2	42
24.	Russia plans mass production of COVID-19 vaccine from next month: Report	43

-----

**COVID-19: DRDO's Contribution****Business Today**

Tue, 04 Aug 2020

**BT Buzz: New mass COVID-19 tests in the making  
- using saliva, breath, voice, taste and smell**

*Researchers are looking at options beyond swab tests to diagnose COVID-19; multiple experiments are taking place across the world*

*By PB Jayakumar*

**KEY HIGHLIGHTS:**

- *Disadvantages of swab tests forced scientists to look for alternatives*
- *US NIH has selected seven biomedical companies to develop simple mass screening methods*
- *US-based Fluidigm has developed a platform for mass testing using saliva*
- *Israel Defence-DRDO-CSIR collaboration is working on breath and sound-based testing*
- *Social engineering tests using smell, taste, walking and checking blood oxygen levels are also being experimented*

Researchers globally are testing a host of new technologies and simpler ways to detect coronavirus - from saliva, taste, smell and even voice as a replacement to the current methods of testing with nasal and throat swabs.

Swab tests, though used in the gold standard RT-PCR diagnosis, have practical shortcomings like availability of skilled staff, quality collection kits or viral transport medium, high costs, sampling errors, besides the risk of healthcare workers getting infected with the virus. The other blood and plasma-based test platforms are also found to have accuracy issues.

**Simple and fast mass screening**

The US government's National Institutes of Health (NIH) is investing \$248.7 million in new technologies for COVID-19 testing. Under the Rapid Acceleration of Diagnostics (RADx) initiative, it has awarded contracts to seven biomedical diagnostic companies to develop new lab-based and point-of-care tests. These seven, which were given Emergency Use Authorisation (EUA) by the US Food and Drug Authority (FDA), were chosen from over 650 applicants and 31 projects that were found successful in the first phase of trials, said the NIH.

Four of these introduce innovations in laboratory-based testing technologies, including next generation sequencing and integrated microfluidic chips, that can dramatically increase testing capacity and time for the result. This will pave way for fast, simpler and mass screening in schools, companies, malls and other social congregation areas.

The California-based Fluidigm has developed a microfluidics platform, which has the capacity to process thousands of PCR tests per day with a primary focus on saliva samples. San Diego-based Mesa Biotech's hand held RT-PCR machine can detect viral RNA at the point of care and results are available from the removable cartridge in 30 minutes. California-based Talis Biomedical's point of care test detects SARS-CoV-2 through isothermal amplification of viral RNA and an optical detection system, returning a result in under 30 minutes.



San Diego-based Quidel's simple point of care technology to mass screen people can be used in a hospital or a pharmacy setting. Boston-based Ginkgo Bioworks and California's Helix OpCo's next-generation sequencing technologies can process thousands of individual tests at once and make results available in a day or two. Ginkgo is expected scale up to 50,000 tests per day by September and 100,000 per day by the end of the year.

### **Breath and sound to detect virus**

Meanwhile, four technologies to detect the virus in 30 seconds, developed by the Israeli scientists, are being evaluated at Delhi's Dr Ram Manohar Lohia hospital. It's part of a collaboration between the Israeli Defence R&D, India's Defence Research and Development Organisation (DRDO) and the Council of Scientific and Industrial Research (CSIR).

In a first, people will have to blow into or speak in front of a breath-analyser like instrument to collect the sample. Using a technology called terahertz spectroscopy, the sample is deposited on a chip and examined to exactly detect the virus. Results are available in less than a minute. NanoScent, the Israeli firm making the breath analyser test kits, says an extensive trial in Israel for the presence of live virus delivered results with 85 percent accuracy. The product could receive regulatory approval within months. The National Centre of Scientific Research in France is also conducting advanced trials of a breath-analyser machine to detect the virus.

<https://www.businesstoday.in/bt-buzz/bt-buzz-new-mass-covid-19-tests-in-the-making---using-saliva-breath-voice-taste-and-smell/story/411853.html>

## **Pledge Times**

*Tue, 04 Aug 2020*

### **In 30 seconds your voice will know whether or not there's a corona or not!**

*By Bhavi Mandalia*

New Delhi: Identification of covid infection will be possible in 30 seconds. Covid examination will be possible through patient voice and breathing. Although not sure, but a study is going on in Delhi. A team of Israeli Scientists is testing it at the LNJP hospital and is also appealing to people to join the trial. In Delhi, apart from the LNJP, this trial is also going on at Ram Manohar Lohia Hospital. It is being told that about 10 thousand such people will be tried on this new technique of Kovid investigation. If the study is successful, it will be known in 30 seconds whether there is an infection or not.

According to information from LNJP sources, four types of technology have been included in this trial. But the most important is the voice test and breathing test. Apart from this, two other types of technology are being used. The doctor says that 10 thousand people will be tested twice in the trial of this new technique being adopted to detect the infection of corona virus. Sources say that if this trial is successful, not only will people get corona results in just 30 seconds, but it can create a safe path for businesses. After successful testing of this technique, people will be able to live with the corona virus until the vaccine is developed. It is expected that in the coming few days it may result.

The study is being carried out with the joint efforts of the Israeli Embassy and DRDO. It is being told that if this disease does not end for a long time, then there should be a way to check fast, so that the patient is examined in the shortest possible time and the positive patient can not only be isolated, but in time. They will also be able to get treatment. A doctor from LNJP said that apart from many healthcare workers, people associated with fire service are reaching out to become volunteers in this study.

<https://pledgetimes.com/in-30-seconds-your-voice-will-know-whether-or-not-theres-a-corona-or-not/>

# छोटू टैंक: चीन-भारत में तनाव के बीच रूस ने भारत को ऑफर किए 18-टन स्पिट टैंक!

By Shivom Gupta

नई दिल्ली: रूस ने पूर्वी लद्दाख में चीन के साथ चल रहे गतिरोध के बीच भारत को अपने 18-टन स्पिट एसडीएम 1 हल्के टैंकों की पेशकश की है। रक्षा और सुरक्षा सूत्रों ने बताया कि जून में रक्षा मंत्री राजनाथ सिंह की रूस यात्रा के दौरान एयरलिफ्ट करने में सक्षम स्पिट टैंक ऑफर किए गए थे, जिसका वजन 18 टन है, जो हल्के टैंक पहाड़ी इलाकों में अधिक गतिशील माने जाते हैं।

**भारत ने लद्दाख में टी-72 के बजाय 46 टन वजनी टी -90 टैंक तैनाती की**

रूस की ओर से यह ऑफर तब किया गया था जब भारत ने टी-72 टैंकों की तैनाती की बजाय 46 टन वजनी टी -90 टैंकों को लद्दाख में तैनाती की है, जबकि टी-72 टैंक का वजन लगभग 45 टन है, जो पहले भी तैनात किए जा चुके हैं।



**गतिरोध के बीच ने चीन ने अपने नए हल्के टैंक टाइप 15 को तैनात किया**

दरअसल, गतिरोध के बीच ने चीन ने अपने नए हल्के टैंक टाइप 15 को तैनात किया है, जिसका वजन लगभग 33 टन है। चूंकि लाइटवेट टैंक 40 टन वजनी युद्धक टैंकों की तुलना में पहाड़ी इलाकों में अधिक गतिशीलता प्रदान करते हैं। राजनाथ सिंह के रूस यात्रा के दौरान नई दिल्ली और माँस्को ने वास्तविक नियंत्रण रेखा (LAC) पर तनाव के मद्देनजर खरीदी और बेची जा सकने वाली वस्तुओं की एक सूची तैयार की थी।

**भारत की मांगों में लाइटवेट टैंक का प्रस्ताव नहीं किया गया था**

सूत्रों ने कहा कि भारत की मांगों में लाइटवेट टैंक की सुविधा नहीं थी, लेकिन यह रूसी प्रस्ताव का हिस्सा था। हालांकि कुछ स्रोतों ने कहा है कि माँस्को और रूसी अधिकारियों में भारतीय दूतावास के बीच तकनीकी चर्चा चल रही है। तकनीकी चर्चा के तहत दोनों पक्षों ने अपनी क्षमताओं और सीमाओं को समझने के लिए हथियार प्रणाली के तकनीकी पहलुओं के बारे में बात की थी, लेकिन रक्षा सूत्रों ने कहा कि वर्तमान में इन हल्के वजन वाले टैंकों की कोई आपातकालीन खरीद की योजना नहीं है।

**हल्के टैंकों की आवश्यकता को पहले भी नोटिस किया जा चुका है**

हल्के वजन वाले टैंकों की आवश्यकता को पहले भी नोटिस किया जा चुका है, लेकिन इसमें सेना की रुचि चीन के साथ तनाव के मद्देनजर ही आई है। 2009 में सेना ने नए माउंटेन डिवीजनों के लिए 200 पहिए और 100 ट्रैक किए गए हल्के वजन के टैंकों के लिए एक अनुरोध के लिए सूचना (आरएफआई) जारी की थी।

**रक्षा अनुसंधान और विकास संगठन (DRDO) हल्के टैंकों पर काम कर रहा है**

अब सरकार द्वारा संचालित रक्षा अनुसंधान और विकास संगठन (DRDO) हल्के टैंकों पर काम कर रहा है। K9 mm वज्र के 155 मिमी के स्व-चालित होवित्जर को 35-टन हल्के वजन वाले टैंक में परिवर्तित करने के लिए डीआरडीओ निजी कंपनी लार्सन एंड टुब्रो से बातचीत कर रहा है।

**DRDO के नियोजित डिजाइन K9 को मॉड्यूलर बुर्ज से बदल दिया जाएगा**

डीआरडीओ के नियोजित डिजाइन के अनुसार K9 के 155/52 मिमी के होवित्जर को बेल्जियम की फर्म जॉन कॉक बंदूकरेल डिफेंस एसए द्वारा बनाए गए मॉड्यूलर बुर्ज और 105 मिमी की से बदल दिया जाएगा। बंदूक 42-डिग्री ऊंचाई पर फायरिंग करने में सक्षम है, जो पहाड़ी युद्ध के परिदृश्य में मददगार होगी।

**भारत के पास हल्के टैंक थे, 1947-48 कश्मीर ऑपरेशन में उपयोग किया गया**

यदि परियोजना विफल हो जाती है, तो इन टैंकों के उत्पादन के लिए वज्र की एलएंडटी की उत्पादन लाइन का उपयोग किया जाएगा। हालांकि अनुबंध के तहत 100 वज्र का वितरण होने के बाद सूरत में उत्पादन लाइन वर्ष के अंत तक सुस्त हो जाएगी। वैसे, भारत के पास हल्के टैंक थे जिनका उपयोग 1947-48 कश्मीर ऑपरेशन और फिर 1962 और 1971 के युद्धों के दौरान किया गया था। हालांकि, बाद में उन्हीं के जरिए देश में भारी टैंकों का मार्ग प्रशस्त हुआ था।

<https://hindi.oneindia.com/news/india/small-tanks-russia-offers-18-ton-sprut-tank-to-india-amid-tension-in-china-and-india/articlecontent-pf300938-572924.html>



Tue, 04 Aug 2020

# DPEPP 2020: Defence Ministry releases Policy draft to make India among leading Nations of world in defence sector

*The draft aims at providing impetus to self-reliance in defence manufacturing, multiple announcements were made under 'Atmanirbhar Bharat Package'*

*Edited By Arun Kumar Chaubey*

### **Highlights**

1. ***"The DPEPP 2020 is envisaged as overarching guiding document of MoD to provide a focused, structured and significant thrust to defence production capabilities of the country for self-reliance and exports," said the MOD***
2. ***It aims to achieve a turnover of Rs 1,75,000 Crores (US\$ 25Bn) including export of Rs 35,000 Crore (US\$ 5 Bn) in Aerospace and Defence goods and services by 2025***
3. ***To develop a dynamic, robust and competitive Defence industry, including Aerospace and Naval Shipbuilding industry to cater to the needs of Armed forces with quality products.***

New Delhi: To make India among the leading countries of the world in the defence sector, including Aerospace and Naval Shipbuilding sectors, from design to production, with active participation of public and private sector and thus fulfilling the twin objectives of self-reliance and exports, Ministry of Defence (MoD) has formulated a draft Defence Production and Export Promotion Policy 2020 (DPEPP 2020), according to a government statement.

The draft aims at providing impetus to self-reliance in defence manufacturing, multiple announcements were made under 'Atmanirbhar Bharat Package'. "The DPEPP 2020 is envisaged as overarching guiding document of MoD to provide a focused, structured and significant thrust to defence production capabilities of the country for self-reliance and exports," said the MOD.



File pic: Zee News

### **DPEPP 2020: Goals and Objectives**

The policy has the following goals and objectives:

1. To achieve a turnover of Rs 1,75,000 Crores (US\$ 25Bn) including export of Rs 35,000 Crore (US\$ 5 Bn) in Aerospace and Defence goods and services by 2025.
2. To develop a dynamic, robust and competitive Defence industry, including Aerospace and Naval Shipbuilding industry to cater to the needs of Armed forces with quality products.
3. To reduce dependence on imports and take forward "Make in India" initiatives through domestic design and development.
4. To promote export of defence products and become part of the global defence value chains.

5. To create an environment that encourages R&D, rewards innovation creates Indian IP ownership and promotes a robust and self-reliant defence industry.

### **FOCUS AREAS**

Procurement Reforms: Indigenization & Support to MSMEs/Startups; Optimize Resource Allocation; Investment Promotion, FDI and Ease of Doing Business; Innovation and R&D; DPSUs and OFB; Quality Assurance and Testing Infrastructure; and Export Promotion.

Expeditious and streamlined procurement procedures are helpful in the development of Defence Production ecosystem and to impact the flow of investments into the sector as well as the use of technologies already developed by DRDO. Several reforms in the Defence Procurement Procedure for capital procurement have been proposed and are being notified. DPP2020 relies on the emerging dynamism of the Indian industry to build domestic capabilities for designing, developing and manufacturing defence equipment. The revision of Defence Procurement Manual (DPM) for revenue procurement is also underway.

In addition to the above, the following strategies are proposed for expanding the domestic defence manufacturing ecosystem.

1. A negative list of weapons/platforms would be notified with year-wise timelines for placing an embargo on import of such items from those dates. This list would be updated periodically, without compromising on the operational requirements of the Services, to allow lead-time to industry to prepare itself for any such procurement which is likely to come up, subsequent to the indicated embargo date.
2. Defence procurement is a highly specialized activity that requires apriori estimation of the development and production lead times specifications and technologies involved, life cycle costs and maintenance requirements etc. of the platforms, equipment and weapon systems. In order to make the above assessment, a Project Management Unit (PMU), with representation from the Services, would be set up to support the acquisition process and facilitate the management of the contracts. This setup would bring in expertise to the process of acquisition as well as create focus and synergy in building military capabilities.
3. With self- reliance as the motto, the aim is to move away from licensed production to Design, Develop and produce wherein the Nation owns the Design Rights and IP of the systems. With this in view for systems projected in the LTIPP, a Technology Assessment Cell (TAC), with representation from the Services, would be created which would make an assessment of the TRL levels available in the country for all the major systems/ platforms and provide advice for initiation of AONs taking note of the time frames needed for development, trials and induction of systems to avoid immediate procurement requests to the maximum extent.

The Technology Assessment Cell would also assess the industrial capability for design, development and production including re-engineering for production of various major systems like Armoured Vehicles, Submarines, Fighter Aircraft, Helicopters, Radars with the major industries in the country which could be categorized as:

1. System integrators with Design, Development, production, testing & certification capability and ability to develop and sustain the ecosystem required for the next 25-30 years. 5.3.2 System integrators who lack integral design, development and certification capability but have the capability and infrastructure to be development cum production partners of DRDO/ any other domestic development agency and have the ability to sustain the ecosystem so developed for next 25-30 years.
2. In addition, the Technology Assessment Cell (TAC) would carry out the scan of regional and global technological capacities and would also render advice to the Services while formulating SQRs.
3. Procurement of indigenously developed products/systems involves conducting a number of tests and trials and consumes a considerable amount of time as a result of which placement of orders is delayed and industry finds it difficult to carry out advance production planning. A



comprehensive review and overhaul of the trials and testing procedures would be done to reduce the procurement cycle time.

4. Our Armed forces have over the years acquired a range of platforms from diverse sources leading to a buildup of spares and consumables which has resulted in sub-optimal planning and resource allocation. Efforts would be made to adopt a family of weapons approach to standardize and optimize inventory and supply chain management.
5. All Acceptances of Necessity (AoNs) involving procurement from domestic sources would be reviewed for time-bound procurement.
6. Efforts would be made to provide the industry greater visibility into the likely opportunities in the defence sector. Understanding future capital acquisition priorities will enable industry to develop technologies, carry out necessary groundwork and position themselves in an optimal manner to compete at the appropriate time. The process of obtaining AONs should be initiated by the SHQs taking note of the lead times needed for development and production indicating the overall quantities required.

### **Indigenization And Support to MSMEs/STARTUPS**

The indigenization policy laid out by the department aims to create an industry ecosystem to indigenize the imported components (including alloys and special materials) and sub-assemblies for defence equipment and platform manufactured in India. 5,000 such items are proposed to be indigenized by 2025.

#### **In order to achieve this objective, the following strategies are proposed:**

1. An indigenization portal will be developed for DPSUs/OFB/Services with an industry interface to provide development support to MSMEs/Startups/Industry for import substitution.
2. The Make-II process will be further strengthened and monitored to make it easier for the industry to provide indigenous solutions.
3. Inter-Governmental processes would be taken forward to indigenize spares and components for legacy platforms and equipment.
4. Public Procurement Order will be made applicable for procurement preference to those items in Defence sector for which domestic production capability exists.
5. The current provisions to enable Startups and MSMEs to participate in the procurement process would continue to be reviewed and further strengthened.
6. Defence Investor Cell in Department of Defence Production will provide handholding to MSMEs, investors and vendors in defence production for resolving issues with Central, State and other authorities.
7. Vendor Development would be taken up by OFB/ DPSUs and use of TReDS platform would be mandated for improving their liquidity and timely payments.
8. In the case of the critical products and materials currently being imported, DPSUs/OFB would consider issuing long term orders as feasible to incentivize the domestic industry and also have provision for a repeat order. In such cases, the resultant single vendor should also be acceptable with due price discovery and negotiations.
9. Services will hand-hold the industry through continuous interactions, sharing of information and arranging visits to repair establishments/field depots for better understanding/appreciation of the requirements.

#### **The policy has laid out the following goals and objectives:**

- Procurement Reforms
- Indigenization & Support to MSMEs/Startups
- Optimize Resource Allocation
- Investment Promotion, FDI & Ease of Doing Business
- Innovation and R&D
- DPSUs and OFB

- Quality Assurance & Testing Infrastructure
- Export Promotion

<https://zeenews.india.com/india/dpepp-2020-defence-ministry-releases-policy-draft-to-make-india-among-leading-nations-of-world-in-defence-sector-2300329.html>

## THE TIMES OF INDIA

Tue, 04 Aug 2020

# Draft policy seeks self-reliance for India in defence production

By Rajat Pandit

New Delhi: Languishing in the strategically-vulnerable position of being among the top three arms importers in the world for years, India now wants to build a major defence industrial base (DIB) for self-reliance in weapon systems and exports to other countries within the next five years.

The defence ministry on Monday released a draft defence production and export promotion policy (DPEPP 2020), with the stated objective of achieving a turnover of Rs 1,75,000 Crores (\$ 25 billion), including export of Rs 35,000 Crore (\$ 5 billion) in aerospace and defence goods and services by 2025.

A similar draft policy in 2018 had set out similar goals, but nothing much came out of it. The estimated size of the existing Indian defence industry is around Rs 80,000 crore, with the public sector's contribution being almost 80% of it.

There is no getting away from the fact that India desperately needs to bolster its fledgling DIB by getting the private sector to jump into defence production in a major way.

The public sector, which includes DRDO and its 50 labs, four defence shipyards, five defence PSUs and 41 ordnance factories, also concurrently needs to be drastically overhauled to deliver cutting-edge weapon systems without huge time and cost overruns.

The ongoing military confrontation with China has only served to further drive home this point with the 15-lakh strong armed forces scrambling to import a wide array of weapon systems, from drones and assault rifles to missiles and ammunition, to maintain operational readiness along the northern borders.

But whether the stated goals of the draft DPEPP 2020, which is envisaged as an "overarching document to provide a focused, structured and significant thrust to defence production capabilities", can be achieved in five years remain to be seen.

The draft DPEPP says the aim is to reduce dependence on imports and take forward "Make in India" initiatives through domestic design and development, as also promote export of defence products as part of the overall 'Atmanirbhar Bharat' policy.

DRDO, for instance, will set up missions in select fields in consultation with the armed forces and other scientific and industrial establishments to develop futuristic weapon systems.

These range from hypersonic, ballistic and cruise missiles to armoured vehicles, gas turbine engines, submarines, fifth-generation fighter jets, transport aircraft, robotics and airborne sensors.

The draft policy brings out multiple strategies with the focus areas being procurement reforms; indigenization and support to MSMEs/Startups; optimization of resource allocation; investment

### EYES ₹35K CR EXPORTS

- Policy eyes turnover of ₹1,75,000cr, including exports of ₹35,000cr in aerospace and defence goods & services
- Aims to reduce need for imports and push "Make in India" initiatives through domestic design, development
- Focuses on support to MSMEs/startups, optimisation of resource allocation, ease of doing business, FDI, investment promotion, R&D and export promotion

promotion, FDI and ease of doing business; innovation and R&D; DPSUs and ordnance factories; quality assurance and testing infrastructure; and export promotion.

The policy comes after the government in May made it clear the armed forces will have to shed their penchant for exorbitant foreign weapon systems unless they can be made in India through joint ventures with global armament and aviation majors.

The government had also announced the import of certain weapons would be banned through a progressively-expanding negative list, while the FDI limit would be hiked to 74% from the existing 49% in the defence production sector through the automatic clearance route.

With an annual defence budget of about \$70 billion, India is behind only the US (\$732 billion) and China (\$261 billion) in terms of military expenditure around the globe. It is also the second-largest buyer of foreign weaponry after Saudi Arabia in the world, accounting for 9.2% of the total global arms imports during 2015-2019, as was earlier reported by TOI.

<https://timesofindia.indiatimes.com/india/govt-comes-out-with-draft-defence-production-policy-to-boost-indigenous-weapons-exports/articleshow/77336027.cms>

## THE TIMES OF INDIA

Tue, 04 Aug 2020

### ‘Equip army with digital arsenal due to geo-politics shift’

Jodhpur: On the occasion of its 13th foundation day of IIT-Jodhpur, Chairman of the 15th Finance Commission has called upon the need for modernisation of the forces by equipping them with digital technologies in view of the shifting geo-politics.

N K Singh said that organisations such as the DRDO and CSIR have already been working for modernisation of the defence forces, but now private institutions should also come forward.

He also stressed on bringing technological revolution in the agriculture sector and said there was a pressing need in the sector to bring in digital agro revolution.

Meanwhile, the premier technology institution, taking a big stride towards its commitment to emerge a hub in the field of research and studies in artificial intelligence in the country, announced to launch two schools, one each in AI and data science.

These schools will be further ameliorated by establishment of centres of excellence in AI, data science, machine learning and internet of things to promote research in these fields, which according to the tech experts are the fields of future.

Director of the IIT-Jodhpur Santanu Chaudhury said the institute has been consistently taking strides towards exploring and establishing itself as a hub of AI education in the country.

The institution has also decided to introduce 3 other UG courses from this session namely civil and infrastructure engineering, chemical engineering and material engineering.

All these new UG courses will come as addition to existing 4 UG courses, electrical engineering, bio-engineering, mechanical engineering and computer science, which the institution has been offering since its inception in 2008.

IIT-Jodhpur has also been rolling out courses combining diverse streams in its pursuit to prepare the leaders for Industry 4.0 amalgamating management and technology through a tech MBA and medical and technology through a PG course in medical technology in association with the IIMS Jodhpur.

<https://timesofindia.indiatimes.com/city/jaipur/equip-army-with-digital-arsenal-due-to-geo-politics-shift/articleshow/77339552.cms>

## Draft Defence Production policy makes defence sector 'Atmanirbhar'

*The policy aims to provide impetus to self-reliance in defence manufacturing under the Atmanirbhar Bharat Scheme*

Self-reliance in defence has been the cornerstone of India's defence production policy. The recent call for "ATMA NIRBHAR BHARAT" has provided further impetus to realise the goal of self-reliance. Over the years, transparent and streamlined Procurement Procedures, Production Policies and 'Make in India' initiatives have provided significant stimulus to demand for indigenous products. Indian Defence industry, primarily catering to the needs of the armed forces, has evolved with diversified product mix and market. Propelled by the recent successes in exports, India is set to realize its potential as an emerging defence manufacturing hub.

Over the years, the Department of Defence Production (DDP), Ministry of Defence, Government of India has facilitated establishment of wide-ranging production facilities of various defence equipment through Ordnance Factories and Defence Public Sector Undertakings (DPSUs) and, from the year 2001, through licensed private sector companies. This has resulted in the development of a diverse range of products such as arms and ammunitions, tanks, armored vehicles, heavy vehicles, fighter aircrafts and helicopters, warships, submarines, missiles, ammunition, electronic equipment, earth moving equipment, special alloys and special purpose steels.



(Representational picture) Reuters file

Defence Research & Development Organisation (DRDO), the R&D wing of Ministry of Defence envisions empowering India with cutting-edge defence technologies. A large number of state-of-the-art weapon systems/platforms/equipment have been designed and developed by DRDO to meet the requirement of the armed forces through a strong indigenous technology base. The development and production of strategic systems and platforms such as Agni and Prithvi series of missiles; Tejas-light combat aircraft; Pinaka-multi-barrel rocket launcher; Akash-air defence system; a wide range of radars and electronic warfare systems; Dhanush-artillery gun; Arjun-main battle tank etc have given a quantum jump to India's military might, generating effective deterrence and providing crucial leverage.

Indian Armed Forces through their in-house design wings and Directorates of Indigenization have also contributed significantly to the development of design and production capabilities in India. The size of the Defence Industry, including Aerospace and Naval Shipbuilding Industry, is currently estimated to be about Rs 80,000 Cr (2019-20). While the contribution of Public Sector is estimated to be Rs 63,000 crores, the share of Private Sector has steadily grown to Rs 17,000 crores over the years.

Defence Public Sector Undertakings (DPSUs) like Hindustan Aeronautics Limited (HAL) in Aerospace, Mazagon Dock Shipbuilders Limited (MDL), Garden Reach Shipbuilders & Engineers Limited (GRSE), Goa Shipyard Limited (GSL) and Hindustan Shipyard Limited (HSL) in naval, Bharat Dynamics Limited (BDL), BEML Ltd, Mishra Dhatu Nigam (MIDHANI) in special Metals and Alloys, Ordnance Factory Board (OFB) in land systems and Bharat Electronics Limited (BEL) in strategic electronics have been the pillars of the defence production ecosystem in the country. The DPSUs have come a long way in terms of development of products and technologies through their own R&D as well as in collaboration with DRDO labs.

In the private sector, many engineering majors have diversified and joined the Defence sector. More than 460 licenses have so far been issued to private companies for production of defence equipment.

The defence industry is ably supported by a strong base of over 8,000 MSMEs that provide strength and vibrancy to the defence supply chain. 1.2 Defence Procurement Procedure (DPP) being notified over the years for capital acquisition of the Armed Forces of India aims to develop a robust industrial ecosystem by giving preference to 'Make in India' initiatives.

Defence Procurement Manual (DPM) 2009 lays down guidelines for procurement of goods and services meant for operation and maintenance viz. equipment, stores, spares, as well as packing/unpacking, delivery, transportation, insurance, leasing, consultancy, software development, etc.

DPP and DPM together cover government's procedures for fulfilling capital and revenue needs of goods/services for the armed forces. These two procedures are the demand side engines that have fueled growth of defence manufacturing in India.

Significant efforts have been made to ease the licensing/investment processes to allow participation of the private sector. Startups have been steadily gaining ground after the launch of the 'Start-Up India' programme. Innovations for Defence Excellence (iDEX) has provided a platform for startups to get connected to the defence establishment.

It is imperative that focused attention is laid on promotion of exports of Indian defence products. Export authorisation procedures have been streamlined through the introduction of online procedures and portals. Defence Lines of Credit (LOCs) being extended to sovereign governments are also enabling buyers in those countries, to import goods and services from India on attractive credit terms.

Defence Offsets are intended to leverage capital acquisitions of Armed forces to develop domestic defence industry. The policies for offsets are intended to further boost the domestic industry's capability through 4 sourcing of defence products, investments in defence sector, transfer of technology etc.

The present 'Defence Production & Export Promotion Policy (DPEPP) 2020' is positioned as Ministry of Defence's overarching guiding document to provide a focused, structured and significant thrust to defence production capabilities of the country for self-reliance and exports.

## **VISION**

To make India amongst the leading countries of the world in Defence sector, including Aerospace and Naval Shipbuilding sectors, from design to production, with active participation of public and private sector and thus fulfilling the twin objectives of self-reliance and exports.

## **GOALS AND OBJECTIVES**

The policy has the following goals and objectives:

To achieve a turnover of Rs 1,75,000 Crores (US\$ 25Bn) including export of Rs 35,000 Crore (US\$ 5 Bn) in Aerospace and Defence goods and services by 2025.

To develop a dynamic, robust and competitive Defence industry, including Aerospace and Naval Shipbuilding industry to cater to the needs of Armed forces with quality products.

To reduce dependence on imports and take forward "Make in India" initiatives through domestic design and development.

To promote export of defence products and become part of the global defence value chains

To create an environment that encourages R&D, rewards innovation, creates Indian IP ownership and promotes a robust and self-reliant defence industry.

## **FOCUS AREAS**

Procurement Reforms

Indigenization & Support to MSMEs/Startups

Optimize Resource Allocation 4.4 Investment Promotion, FDI & Ease of Doing Business

Innovation and R&D

DPSUs and OFB

Quality Assurance & Testing Infrastructure

Export Promotion

### **PROCUREMENT REFORMS**

Expeditious and streamlined procurement procedures are helpful in the development of Defence Production ecosystem and to impact the flow of investments into the sector as well as the use of technologies already developed by DRDO. Several reforms in the Defence Procurement Procedure for capital procurement have been proposed and are being notified. DPP2020 relies on the emerging dynamism of the Indian industry to build domestic capabilities for designing, developing and manufacturing defence equipment. The revision of Defence Procurement Manual (DPM) for revenue procurement is also underway. In addition to above, following strategies are proposed for expanding the domestic defence manufacturing ecosystem.

A negative list of weapons/platforms would be notified with year-wise timelines for placing an embargo on import of such items from those dates. This list would be updated periodically, without compromising on the operational requirements of the Services, to allow lead-time to industry to prepare itself for any such procurement which is likely to come up, subsequent to the indicated embargo date.

Defence procurement is a highly specialized activity that requires apriori estimation of the development and production lead times specifications and technologies involved, life cycle costs and maintenance requirements etc. of the platforms, equipment and weapon systems. In order to make the above assessment, a Project Management Unit (PMU), with representation from the Services, would be set up to support the acquisition process and facilitate management of the contracts. This setup would bring in expertise to the process of acquisition as well as create focus and synergy in building military capabilities.

With self- reliance as the motto, aim is to move away from licensed production to Design, Develop and produce wherein the Nation owns the Design Rights and IP of the systems. With this in view for systems projected in the LTIPP, a Technology Assessment Cell (TAC), with representation from the Services, would be created which would make an assessment of the TRL levels available in the country for all the major systems/ platforms and provide advice for initiation of AONs taking note of the time frames needed for development, trials and induction of systems to avoid immediate procurement requests to the maximum extent. The TAC would also assess the industrial capability for design, development and production including re-engineering for production of various major systems like Armoured Vehicles, Submarines, Fighter Aircraft, Helicopters, Radars with the major industries in the country which could be categorized as:

System integrators with Design, Development, production, testing & certification capability and ability to develop and sustain the ecosystem required for the next 25-30 years.

System integrators who lack integral design, development and certification capability but have the capability and infrastructure to be development cum production partners of DRDO/ any other domestic development agency and have the ability to sustain the ecosystem so developed for next 25-30 years. In addition, the Technology Assessment Cell (TAC) would carry out the scan of regional and global technological capacities and would also render advice to the Services while formulating SQRs.

Procurement of indigenously developed products/systems involves conducting a number of tests and trials and consumes a considerable amount of time as a result of which placement of orders is delayed and industry finds it difficult to carry out advance production planning. A comprehensive review and overhaul of the trials and testing procedures would be done to reduce the procurement cycle time.

Our Armed forces have over the years acquired a range of platforms from diverse sources leading to a buildup of spares and consumables which has resulted in sub-optimal planning and

resource allocation. Efforts would be made to adopt a family of weapons approach to standardize and optimize inventory and supply chain management.

All Acceptances of Necessity (AoNs) involving procurement from domestic sources would be reviewed for time-bound procurement.

Efforts would be made to provide the industry greater visibility into the likely opportunities in the defence sector. Understanding future capital acquisition priorities will enable industry to develop technologies, carry out necessary ground work and position themselves in an optimal manner to compete at the appropriate time. The process of obtaining AONs should be initiated by the SHQs taking note of the lead times needed for development and production indicating the overall quantities required.

### **INDIGENIZATION AND SUPPORT TO MSMEs/STARTUPS**

The indigenization policy laid out by the department aims to create an industry ecosystem to indigenize the imported components (including alloys and special materials) and sub-assemblies for defence equipment and platform manufactured in India. 5,000 such items are proposed to be indigenized by 2025. In order to achieve this objective, following strategies are proposed:

An indigenization portal will be developed for DPSUs/OFB/Services with an industry interface to provide development support to MSMEs/Startups/Industry for import substitution.

The Make-II process will be further strengthened and monitored to make it easier for the industry to provide indigenous solutions.

Inter-Governmental processes would be taken forward to indigenize spares and components for legacy platforms and equipment.

Public Procurement Order will be made applicable for procurement preference to those items in Defence sector for which domestic production capability exists.

The current provisions to enable Startups and MSMEs to participate in the procurement process would continue to be reviewed and further strengthened.

Defence Investor Cell in Department of Defence Production will provide handholding to MSMEs, investors and vendors in defence production for resolving issues with Central, State and other authorities.

Vendor Development would be taken up by OFB/ DPSUs and use of TReDS platform would be mandated for improving their liquidity and timely payments.

In case of the critical products and materials currently being imported, DPSUs/OFB would consider issuing long term orders as feasible to incentivize the domestic industry and also have provision for repeat order. In such cases, resultant single vendor should also be acceptable with due price discovery and negotiations.

Services will hand-hold the industry through continuous interactions, sharing of information and arranging visits to repair establishments/field depots for better understanding/appreciation of the requirements.

### **OPTIMIZE RESOURCE ALLOCATION**

The Department of Defence Production has laid out a target to achieve a turnover of Rs.1,75,000 crores (USD 25 Bn) in Aerospace and Defence Goods & Services by 2025. The share of domestic procurement in overall Defence procurement is about 60 per cent. In order to enhance procurement from domestic industry, it is incumbent that procurement is doubled from the current Rs 70,000 crore to Rs 1,40,000 crore by 2025. In order to achieve this objective, following strategies are proposed:

- To carve out a distinct budget head for domestic capital procurement.
- To strive for enhancing allocation for domestic capital procurement at the rate of minimum 15 per cent per annum for the next five years.

Various studies have over the years brought out the need to enhance cost effectiveness and improve efficiency in the use of MoD's resources. Efforts would be made to scrutinize, evaluate and optimize various items of expenditure in the Defence budget.

OFB/DPSUs will be mandated to increase productivity, enhance quality, reduce costs and ensure timely execution of orders by optimizing inventory management, greater vendor outsourcing at all levels, improving skill levels and overall project management.

### **INVESTMENT PROMOTION, FDI AND EASE OF DOING BUSINESS**

India is emerging as an attractive investment destination. The improvement in the India's ranking in World Bank's 'Ease of Doing Business' (EoDB) report, market size, demographic dividend and availability of diverse skill sets have been driving this momentum. Defence being a monopsony, investments in this sector are incumbent on regular supply of orders. However, India's emergence as a Defence manufacturing hub with rising exports offers a unique opportunity now for attracting investments in defence and aerospace sectors. India is already a large aerospace market with rising passenger traffic and increasing military expenditure, as a result of which the demand for aircrafts (fixed and rotary wings) is increasing. The opportunities in the aerospace industry have been identified in the following segments:

- a) Aircraft Build Work
- b) Aircraft MRO
- c) Helicopters
- d) Engine manufacturing and MRO work
- e) Line Replaceable Units (LRUs)
- f) Unmanned Aerial Vehicles (UAVs)
- g) Upgrades & Retrofits

Investment Promotion Investments would be encouraged to provide specific focus on certain identified segments and technological areas. Investments in aviation sector which help in co-development and strengthening defence ecosystem would be facilitated in association with the Ministry of Civil Aviation. Efforts would be made to address the identified gaps in those segments and offer incentives to global OEMs and domestic industry to set up design and manufacturing facilities in India. The investments in these segments would also be channelized by offering high multipliers through offsets obligations.

Considering the current status and the future potential, following segments would be supported.

Development of Aero Engines Complex India has manufactured close to 4,000 aero platforms since inception and has built capacities to produce various platforms, including Light Combat Aircraft (LCA), Advance Light Helicopter (ALH), Light Combat Helicopter (LCH), Light Utility Helicopter (LUH) and Dornier. Most of these platforms make use of imported aero engines and related components. While significant improvements have been made, there are still critical gaps in the aero engine segment for future development programmes as well as for taking up the engine related MRO activities of the current inventory of platforms.

Maintenance Repair & Overhaul (MRO) With recent rationalization in the GST structure, MRO activities in Aerospace sector have got a major fillip. The sector would be developed as a pivot for the development of the Aerospace sector and the components industry which would entail seeking lifetime support for large platforms to enable setting up of adequate facilities for spare, repair and maintenance during the life-cycle of such platforms. Automotive component manufacturers and other similarly relevant industries could through appropriate skill development and technology upgradation initiatives, diversify to aerospace components design and manufacturing.

Critical Technologies & Materials India has made significant progress in developing unique technologies and wide range of complex systems that includes missiles, radar systems, fighter aircrafts, main battle tanks, rocket systems, under water systems, Naval systems, communication systems, electro optic systems, EW systems, etc. However, further progress in these areas is incumbent on bridging the gaps in certain critical technologies and materials and supplement the efforts made by DRDO and other R&D organizations. Efforts would be made to attract investments for development of such technologies and bring them to a level of maturity.



Defence Corridors The two Defence Corridors set up in Tamil Nadu and Uttar Pradesh would be specifically targeted by providing additional support as well as by offering higher multipliers for offset discharge for investments flowing into the Defence Corridors.

FDI In the current FDI policy for Defence sector notified vide Press Note No. 5 (2016 Series), FDI was allowed under automatic route up to 49% and above 49% through government route wherever it is likely to result in access to modern technology or for other reasons to be recorded. Efforts have recently been made to liberalize FDI in Defence Sector for attracting global OEMs to shift manufacturing facilities and expand India's presence in international supply chains. Efforts would be made to attract FDI through Invest India and Defence Investor cell.

Licensing process for defence industries would continue to be eased by obtaining regular feedback from the industry and disposal of applications in a time bound manner.

### **INNOVATION AND R&D**

Defence R&D Defence Research & Innovation lies at the heart of development of cutting-edge technologies and systems. By harnessing the nationwide R&D capabilities, future requirements of the services could be met and critical gaps in related technologies would get addressed.

The following strategies are proposed:

DRDO in consultation with the Services and in collaboration with other scientific and industrial establishments would set up missions in select areas to develop futuristic and critical systems/platforms/materials. An indicative list is as below.

- a) Gas Turbine Engines
- b) Hypersonic Missiles
- c) Ballistic & Cruise Missiles
- d) Armoured Vehicles
- e) Submarines
- f) Fifth Generation Fighters
- g) Transport Aircrafts to meet military requirements
- h) Secure communication devices, secure microprocessors and secure routers
- i) Cyber Security Infrastructure
- j) Surveillance Systems
- k) Artificial Intelligence & Robotics including unmanned platforms
- l) Airborne Sensors
- m) Strategic Materials

9.2 The conversion of prototypes into commercially useful products go through a cycle across Technology Readiness Levels (TRLs). A comprehensive reform of the productionisation process would be undertaken to cut down the 'lab to lines' time by roping in production partners at early TRL levels by bringing concurrent engineering practices between research and production agencies.

Systems Engineering approach to derive system specifications for project development would be mandated for capturing the concept, feasibility, requirements, design etc. and detailed in-depth review at each stage would be done through a stage-gate process.

Competitively funded prototyping would be pursued during the design process to address the multiple challenges of technical feasibility, affordability, producibility and supportability. Innovation

Startups Innovations for Defence Excellence (iDEX) has been operationalized to provide necessary incubation and infrastructure support to the startups in defence area. More than 50 startups are currently developing new 'fit-for-military-use' technologies/ products. iDEX would be further scaled up to engage with 300 more startups and developing 60 new technologies/ products during the next five years, and their procurement under Make-II route of DPP.

Mission Raksha Gyan Shakti was launched to promote greater culture of innovation and technology development and file greater number of patents in Defence PSUs and OFB. This effort would be scaled up for promoting creation of Intellectual Property in the sector and its commercial utilization.

The Offset Policy would be reformed to encourage defence investments and acquisition of critical technologies (know why) through higher multipliers.

DPSUs/OFB Over the years, Department of Defence Production has set up wide ranging production facilities for various defence equipment through the 15 Ordnance Factories and Defence Public Sector Undertakings (DPSUs). While significant progress has been made by these units in manufacturing arms and ammunition, tanks, armoured vehicles, heavy vehicles, aircraft and helicopters, sub-marines, missiles, electronic equipment, special alloys etc., it is essential that these organizations are reformed to prepare themselves for the future so that they work in tandem with the private industry. For doing so, following strategies are proposed.

Ordnance factories will be corporatized to make them competitive and to improve their productivity.

Efforts will be made to position DPSUs as system integrators and create a multi-tier domestic supply chain.

OFB/DPSUs will be mandated to maximize outsourcing from indigenous sources.

Disinvestment of DPSUs will be pursued.

Focus would be laid for modernization and technological upgradation in coordination with Services/DRDO.

DPSUs would be encouraged to move towards INDUSTRY 4.0 by using innovative strategies and tools like digital threading to include Internet of Things (IoT), time-stamping by the use of block-chain technology, Artificial Intelligence etc.

A partnership model would be formulated for development of critical technologies and components in DPSUs/OFB to provide a focused approach to the development of indigenous capabilities.

### **QUALITY ASSURANCE AND TESTING INFRASTRUCTURE**

Competitiveness of the Defence Industry depends on robust quality assurance practices and mechanisms and this needs to be ensured in all phases of the product life cycle. In order to streamline the quality assurance process and 16 cut down the "hold points" and reduce the cycle time, following strategies are proposed:

The quality control and assurance process will be comprehensively reviewed and streamlined.

The entire process of quality assurance and its time bound delivery would be rationalized and monitored by developing an IT platform with an industry interface.

Organizational reforms in DGQA/DGAQA would be taken up to rationalize the workforce and enhance their productivity.

Accredited third-party inspection bodies will be promoted to augment the resources of DGQA by outsourcing certain QA functions throughout the value chain.

For the MSMEs to be more quality conscious, 'Zero Defect Zero Effect' is being encouraged. This would help industry to adopt Self Certification and Green Channel route through a process facilitated by DGQA/DGAQA.

The pool of test beds/firing ranges/Quality Assurance (QA)-Quality Control (QC) labs/testing infrastructure will be mapped in the country and enhanced to meet the growing requirements of the Industry.

The existing testing infrastructure with Defence organizations would be made available for private industry use on equal priority.

The airworthiness assurance functions of CEMILAC cover the whole spectrum of activities in Indian Military Aviation such as Ab-initio Designs, Continued Airworthiness and Production

support, Certification of Systems developed abroad, Indigenization and Unmanned Air Vehicles. Efforts would be made to streamline its functioning and strengthen its operations.

Testing facilities of DGQA/DGAQA/DRDO will be upgraded by establishing test rigs/environmental test chambers, able to simulate 17 actual operational conditions. Such simulation based testing will be encouraged and a detailed list of environmental tests, which can be conducted on test rigs /environmental test chambers, would be issued for reference in public domain.

In order to address the grievances and mitigate the concerns of the stakeholders including industry, an appellate mechanism for QA Testing in the form of Independent External Monitor (IEM) would be created.

Efforts would be made to create testing infrastructure through Defence Testing Infrastructure Scheme (DTIS) by providing assistance to industry to set up common testing facilities.

#### **EXPORT PROMOTION**

Defence exports have grown manifold over the last few years. In order to achieve the target of Rs 35,000 crore (US\$ 5 Bn) of Defence Exports by 2025, following strategies are proposed.

Defence Attachés have been mandated and are supported to promote export of indigenous defence equipment abroad. This effort would be supplemented by selected DPSUs which would be positioned to work as export promotion agencies for certain countries with earnings linked to success fee, to promote export of defence products abroad.

Subject to strategic considerations, domestically manufactured defence products will be promoted through Govt to Govt agreements and Lines of Credit/Funding.

Export Promotion Cell set up to promote Defence exports through coordinated action to support the Industry would be further strengthened and professionalized.

DPSUs and OFB would be mandated to have at least 25% of their revenue from exports including success fee earned as target by 2025.

In collaboration with the Industry associations, DDP would facilitate on boarding of Indian Offset Partners (IOPs) in the discharge of offset obligations by OEMs.

Defence Expo and Aero India will be positioned as major global events to showcase India's capabilities in defence manufacturing, and also to encourage exports. This would be supplemented by branding the Indian Defence products. Defence Industry delegations would be organized to targeted countries in addition to participation in prominent global defence expositions.

The end-to-end export clearance process in the Department of Defence Production would be further upgraded to make the process seamless and time-bound.

In consonance with the provisions of various Multilateral Arms control protocols, Open General Export License (OGEL) regime would be utilized to encourage export of selected defence equipment/items to identified friendly countries.

Achievements of Indian Defence industry would be showcased on running basis on Indian Embassy web-sites.

Active support of services would be taken for exploring opportunities for export of defence products.

#### **GOVERNANCE**

The concerned departments of the Ministry of Defence would take necessary action to implement the respective strategies outlined in this Policy.

The Department of Defence Production would be the nodal department for coordination on various components of the Defence Production & Export Promotion Policy (DPEPP) 2020 including obtaining approvals of the competent authorities for various schemes, programs and projects outlined in the strategies to achieve the objectives set in this Policy.

The progress on various stipulations of the Policy would be periodically reviewed and monitored by Defence Minister.

All stakeholders viz. DoD, DMA, DDP, Services, Department of Defence R&D, DPSUs, OFB, etc. will conduct regular outreach programmes in various parts of the country to interact with industry associations, 19 industry especially MSMEs and academia, to spread awareness about the potential opportunities, and also understand the challenges being faced by them.

Institutional data collection mechanism regarding Defence industry, including Aerospace & Naval Shipbuilding industries, in the country, including production, export, import, would be further strengthened.

<https://www.ibtimes.co.in/draft-defence-production-policy-makes-defence-sector-atnmanirbhar-full-text-825743>

**hindustantimes**

Tue, 04 Aug 2020

## India eyeing Rs 1.75 lakh crore in turnover in defence manufacturing by 2025

*The draft Defence Production and Export Promotion Policy 2020 set an export target of Rs 35,000 crore (USD 5 billion) in aerospace and defence goods and services in the next five years, which has been estimated as part of the total projected turnover*

New Delhi: The government is eyeing a turnover of Rs 1.75 lakh crore (USD 25 billion) in defence manufacturing by 2025 as it has identified the sector as a potential driver to boost the overall economy, according to a draft of a major policy prepared by the defence ministry.

The draft Defence Production and Export Promotion Policy 2020 set an export target of Rs 35,000 crore (USD 5 billion) in aerospace and defence goods and services in the next five years, which has been estimated as part of the total projected turnover.

The policy is envisaged as overarching guiding document of the defence ministry to provide a “focused, structured and significant” thrust to production of military hardware and platforms for self-reliance and exports, officials said.

Officials said the policy is aimed at developing a dynamic, robust and competitive defence industry, including aerospace and naval shipbuilding, to cater to the needs of the armed forces.

In May, Finance Minister Nirmala Sitharaman rolled out a number of reform measures for the defence sector including making separate budgetary outlay to procure Indian-made military hardware, increasing FDI limit from 49 per cent to 74 per cent under the automatic route and generating a year-wise negative list of weapons which will not be allowed to import.

India is one of the most lucrative markets for global defence giants as it figured among top three importers of military hardware in the world for the last eight years.

According to estimates, the Indian armed forces are projected to spend around USD 130 billion in capital procurement in the next five years.

The draft Defence Production and Export Promotion Policy (DPEPP) also prescribed a framework to reduce dependence on imports and take forward the “Make in India” initiatives through domestic design and development.

It also suggested steps to promote export of defence products to make India become part of the global defence supply chain.



Defence Minister Rajnath Singh writes onto a Rafale jet fighter as a ritual gesture during an handover ceremony at the Dassault Aviation plant in Merignac, near Bordeaux, southwestern France. (AP)

The officials said the policy paper made several key recommendations to boost defence manufacturing so that the sector compliments the government's aim make the country's economy a USD 5 trillion one by 2024.

In an address at the 11th edition of DefExpo in Lucknow in February, Prime Minister Narendra Modi said lack of proper policy initiative in last several decades made India the biggest importer of defence platforms and that his government has taken a series of initiatives to cut the country's dependence on foreign acquisitions.

The draft policy has laid out a goal to achieve a turnover of Rs 1,75,000 crore (USD 25 billion) including export of Rs 35,000 crore (USD 5 billion) in aerospace and defence goods and services by 2025.

It also laid out goals to create an environment that encourages research and development, rewards innovation, creates Indian IP (intellectual property) ownership and promotes a robust and self-reliant defence industry.

The policy brought out multiple strategies under a range of "focus areas" indigenisation and support to MSMEs and startups, optimisation of resource allocation, FDI in defence, ease of doing business, quality assurance and testing infrastructure and export promotion.

<https://www.hindustantimes.com/india-news/india-eyeing-rs-1-75-lakh-crore-in-turnover-in-defence-manufacturing-by-2025/story-EszPR5d8J8RUCNjnuD2fRM.html>



Tue, 04 Aug 2020

## **Chinese Army's cyber attack unit eyeing information on India's defence and research, warn security agencies**

*According to a report of the security agencies, this secret unit of the People's Liberation of Army (PLA) has intensified its activities against India*

*Edited By Ananya Das*

### **Highlights**

- 1. The Chinese Army's secret unit '61398', known for cyber espionage, is eyeing information related to India's defence and research.***
- 2. According to a report of the security agencies, this secret unit of the People's Liberation of Army (PLA) has intensified its activities against India.***
- 3. Many cases have been reported in the last few months in which Chinese hackers associated with the PLA attempted to gather sensitive information of the country through cyber espionage.***

The Chinese Army's secret unit '61398', known for cyber espionage, is eyeing information related to India's defence and research, the security agencies sounded an alert on Monday. According to a report of the security agencies, this secret unit of the People's Liberation of Army (PLA) has intensified its activities against India.

Many cases have been reported in the last few months in which Chinese hackers associated with the PLA attempted to gather sensitive information of the country through cyber espionage.

Headquartered in Datong Avenue of Pudong district in China's Shanghai, unit '61398' is witnessing a spurt in these activities, asserted an officer deployed in the central security speaking to Zee Media. "Through unit '61398', China has been engaged in gathering information like cyber, space and geolocation intelligence around the world for a long time. These units are found to be very active against India," said the officer.

Since 2015, PLA has centralized its space, cyber and electronic warfare (EW) assets in the newly raised PLA Strategic Support Force (PLASSF). Therefore the unit '61398' which deals with cyber warfare and was under erstwhile 3 PLA (General Staff Department Third Department) have been subordinated under the network system department of the PLASSF.

Another officer who is aware of the development said that there is a report of at least three cyber hackers supporting cyber espionage activities. Recently, there have been attempts made by these hackers to send a special computer programme worldwide by attaching malware tools to cyber espionage. Icebug, Hidden Lynx (a professional advanced persistent threat using the program) and APT-12 have been used for attacking government and industrial organization by Chinese hackers.

In 2014, the US had charged five PLA military officers for espionage and they were part of unit '61398'. The US agencies believe that, like Unit '61398', many such groups exist in China with the active support of the PLA, who are engaged in cyber spying around the world.

Many analysts believe China now has the capability to successfully target critical infrastructure during the war. There is also concern that Chinese hackers may disrupt the electric grid and banking system through cyber attacks.

<https://zeenews.india.com/india/chinese-armys-cyber-attack-unit-61398-eyeing-information-on-indias-defence-and-research-warn-security-agencies-2300298.html>



Tue, 04 Aug 2020

## China's posturing in Indian Ocean to disturb stability amid Ladakh standoff: Experts

*The PLA Navy may need such bases in large numbers to minimise the geographical distance from China, he said while speaking at a webinar organised by Tillotama Foundation*

Kolkata: Defence and strategic experts on Monday said that China's posturing in the Indian Ocean will disturb stability and peace in the region.

Commandant of National Defence College, Vice-Admiral Pradeep Kaushiva, said that the People's Liberation Army (PLA) of China has been establishing naval bases in the Indian Ocean for a long time.

The PLA Navy may need such bases in large numbers to minimise the geographical distance from China, he said while speaking at a webinar organised by Tillotama Foundation.

"In such a scenario, the Indian Ocean is poised for turbulence and I believe it is in the offing," Vice-Admiral Kaushiva said.

He said, "It is time to forge ahead with the Quad security dialogue - comprising the US, Japan, Australia and India - to check the rise of expansionist China and protect the security of the region".

In November 2017, the four countries gave shape to the "Quad" or Quadrilateral coalition to develop a new strategy to keep the critical sea routes in the Indo-Pacific free of any influence.

David Brewster of Australian National University (ANU) said that China's approach to the Indian Ocean is political and strategic.

Brewster is a Senior Research Fellow with the National Security College at the ANU, where he specialises in South Asian and Indian Ocean strategic affairs.



Indian naval ship conducts a Passage Exercise PASSEX with the United States Navy's USS Nimitz carrier strike group as it transits the Indian Ocean. (Photo | Twitter)

He said, "There has been a significant deterioration in the relationship between Australia and China in the last six months as our country hailed the need for an independent inquiry into the COVID crisis".

Subsequently, Beijing had imposed sanctions against Australia, he said.

However, China needs Australian resources like iron ore for which the balance of trade was not in China's favour, Brewster said.

He said that there are growing concerns about China's influence in the Indian Ocean and it is time to make Quad a credible grouping.

According to him, the COVID crisis will substantially change the economics of Belt and Road Initiative (BRI).

The BRI is a multi-billion-dollar initiative launched by Chinese President Xi Jinping when he came to power in 2013.

It aims to link Southeast Asia, Central Asia, the Gulf region, Africa and Europe with a network of land and sea routes.

Jayanath Colombage, additional secretary to the President and former commander of Sri Lankan Navy, said that his country is not happy about what is taking place in the Indian Ocean.

He said that the Hambantota port, in which China has 85 per cent stake, is a Sri Lankan Port and not a Chinese one.

"We will not allow anyone to use a single inch of our land for military purposes which might pose a security threat to India," he added.

<https://www.newindianexpress.com/nation/2020/aug/03/chinas-posturing-in-indian-ocean-to-disturb-stability-amid-ladakh-standoff-experts-2178617.html>



Tue, 04 Aug 2020

## **India ramps up troop build-up at LAC; deploys T-90 tanks, heavy armour to combat Chinese aggression**

*The Indian Army has responded to the troop build-up by the People's Liberation Army (PLA) on the Chinese side of the Line of Actual Control (LAC), by buffing up its own presence near the Daulat Beg Oldi and Depsang plains area. As per latest reports, on top of ramping up the infantry presence in the area, the Indian Army has deployed tanks and other heavy armour weapons to act as a deterrent against any Chinese misadventure*

The Indian Army has responded to the troop build-up by the People's Liberation Army (PLA) on the Chinese side of the Line of Actual Control (LAC), by buffing up its own presence near the Daulat Beg Oldi and Depsang plains area. As per latest reports, on top of ramping up the infantry presence in the area, the Indian Army has deployed tanks and other heavy armour weapons to act as a deterrent against any Chinese misadventure.

Government sources have told ANI that T-90 tank regiments have been mobilised in the area as part of an armoured division.

"We have done a very heavy deployment of troops and tanks in the DBO and Depsang plains area including the T-90 regiments which are part of an armoured division," ANI quoted government sources as saying.



**India ramps up troop build-up at LAC; deploys T-90 tanks, heavy armour to combat Chinese aggression**

The new deployments ramp up the Indian Army presence from Patrolling Point 1 near the Karakoram pass all the way to the Depsang plains where the Chinese have reportedly amassed over 17,000 troops since the face off first began in April-May.

ANI has reported that the sources have claimed that the Chinese would find it difficult to operate there in case they try out any misadventure.

Earlier, when the build up had not happened in the PLA ranks in the area, the region was looked after by a mountain brigade and an armoured brigade but today more than 15,000 troops and several tank regiments have been mobilised in the area.

<https://www.indiatvnews.com/news/india/india-china-clash-ladakh-indian-army-tanks-deployed-in-the-area-chinese-pla-india-vs-china-639289>



Tue, 04 Aug 2020

## No compromise on territorial integrity: India to China during fifth round of military talks

*Senior commanders of the two armies held intense negotiations for nearly 11 hours on Sunday at a designated meeting point in Moldo on the Chinese side of the LAC*

New Delhi: The Indian army has categorically conveyed to China's PLA at the fifth round of military talks it will not compromise on India's territorial integrity, and clearly said disengagement of troops from Pangong Tso and a few other friction points in eastern Ladakh should be completed at the earliest, people familiar with the developments said on Monday.

Senior commanders of the two armies held intense negotiations for nearly 11 hours on Sunday at a designated meeting point in Moldo on the Chinese side of the Line of Actual Control (LAC).

The Indian delegation very clearly and firmly communicated to the Chinese side that restoration of status quo ante in all areas of eastern Ladakh was key for overall ties between the two countries, and that Beijing must ensure complete disengagement of its troops from the remaining friction points, according to the people familiar with the developments.



Indian Army convoy passes through Snow Bound Zojila Pass situated at a height of 11,516 feet on its way to frontier region of Ladakh. (File Photo | PTI)

It was also categorically conveyed that the Indian army will not compromise on the country's territorial integrity, they said.

The Chinese army has pulled back from Galwan Valley and certain other areas but the withdrawal of troops has not moved forward from the Finger Four and Eight areas in Pangong Tso as demanded by India.

The mountain spurs in the area are referred to as Fingers.

China also has not completed withdrawal of troops from Gogra areas.

The focus of the Sunday talks was on finalising the modalities for further de-escalation, and disengagement of troops from various friction points, sources said, adding both sides were to discuss details of the negotiations with their respective military and political leadership.

The sources said Army Chief Gen MM Naravane was given a detailed briefing about the talks on Monday morning which was subsequently followed by a discussion he held with senior military officials on the overall situation in eastern Ladakh.



It is learnt that National Security Advisor Ajit Doval and External Affairs Minister S Jaishankar were also apprised about the talks, and the entire military and strategic brass tasked to deal with the border row is deliberating on various aspects of the overall situation.

The Indian delegation was led by Lt Gen Harinder Singh, the commander of the Leh-based 14 Corps, while the Chinese side was headed by Major General Liu Lin, commander of the South Xinjiang military region.

The previous round of the Corps Commander-level talks took place on the Indian side of the LAC on July 14 and it lasted for nearly 15 hours.

There was no official word on details of the meeting.

The military talks took place 10 days after both sides held another round of diplomatic parleys on the border issue.

After the diplomatic talks, the Ministry of External Affairs (MEA) said both sides agreed that an early and complete disengagement of the troops along the LAC in accordance with bilateral agreement and protocols was essential for the overall development of bilateral relations.

Last week, India rebutted China's claim that the disengagement process was completed at most locations.

"There has been some progress made towards this objective but the disengagement process has as yet not been completed," MEA spokesperson Anurag Srivastava said when asked about China's claim.

In the last three weeks, India has significantly ramped up troops and weaponry in the areas around Daulat Beg Oldi (DBO) and Depsang Valley in commensurate with deployment of troops by China's People's Liberation Army (PLA).

During the military and diplomatic talks, India has also been demanding withdrawal of Chinese troops from Depsang, the area where they had intruded in 2013.

The transgressions had created military and diplomatic tensions but was resolved after hectic rounds of negotiations following which the Chinese troops withdrew.

India began sending reinforcements to Depsang and the areas around DBO in mid-May when tension between the two sides gradually escalated, and the deployment has been significantly ramped up with several thousand troops, tanks and artillery guns in the last two months, sources said.

The formal process of disengagement of troops began on July 6, a day after a nearly two-hour telephonic conversation between NSA Doval and Chinese Foreign Minister Wang Yi on ways to bring down tension in the face-off points.

The first round of the Lt General talks was held on June 6 during which both sides finalised an agreement to disengage gradually from all the standoff points beginning with Galwan Valley.

However, the situation deteriorated following the Galwan Valley clashes on June 15 in which 20 Indian Army personnel were killed as the two sides significantly bolstered their deployments in most areas along the LAC.

The Chinese side also suffered casualties in the clashes but it is yet to give out the details.

According to an American intelligence report, the number of casualties on the Chinese side was 35.

The second round of military talks took place on June 22.

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

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

The Indian Air Force (IAF) has also moved air defence systems as well as a sizable number of its frontline combat jets and attack helicopters to several key air bases.

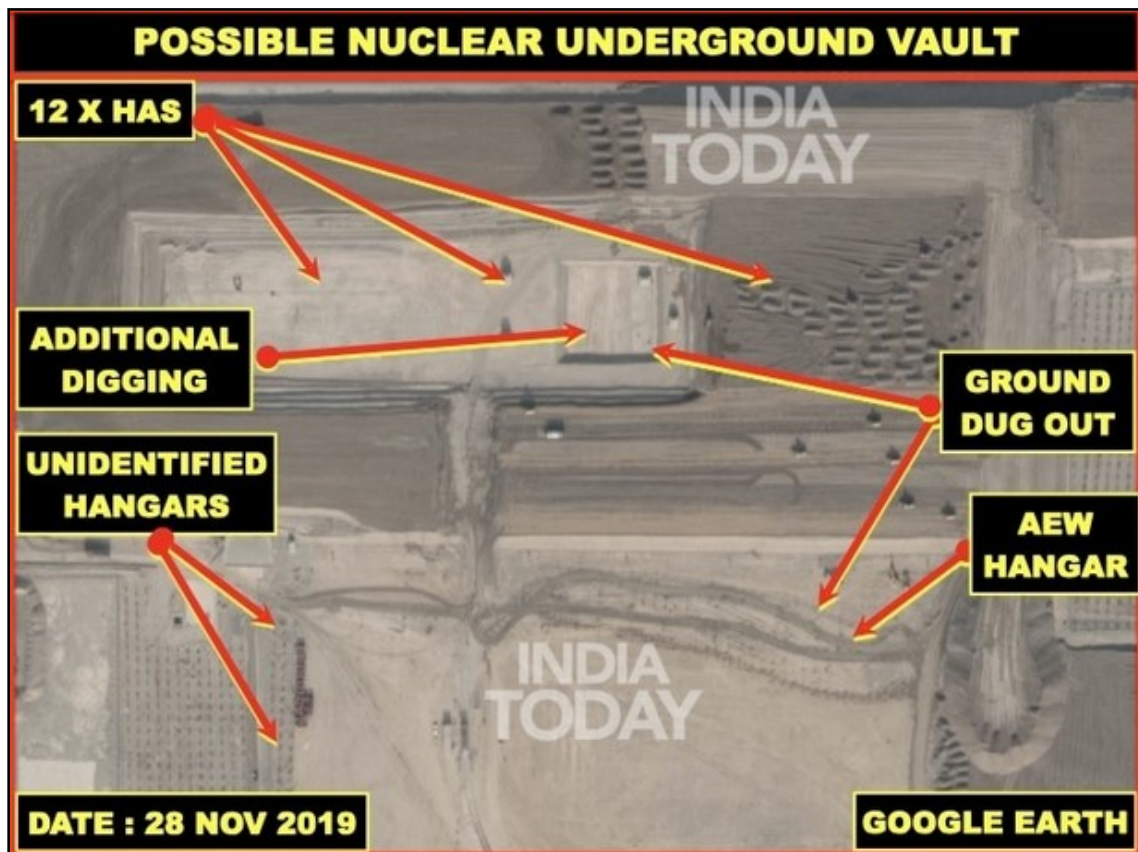
<https://www.newindianexpress.com/nation/2020/aug/03/no-compromise-on-territorial-integrity-india-to-china-during-fifth-round-of-military-talks-2178638.html>

## **China’s Kashgar airbase: Underground vaults hint at nuclear facilities, H-6 bombers seen since early June**

*India Today’s OSINT team analysed satellite images from Google Earth over the last eight months to study the changes at China’s Kashgar air base. Satellite images show construction of an underground vault months before the India-China standoff started in Ladakh*

*By Col Vinayak Bhat*

An underground vault construction in China’s Kashgar airbase months before the India-China standoff started in Ladakh shows how People’s Liberation Army Air Force (PLAAF) has been ramping up infrastructure for air power, satellite images analysed by India Today’s OSINT team suggest.



The underground construction that could be used to conceal nuclear warheads is among the many strategies adopted by China taking an aggressive stand against India including the deployment of its H-6 bomber aircraft in Kashgar. The H-6 bomber aircraft was recently part of war games by in the South China Sea.

The Kashgar airbase is 475 km away from the Karakoram Pass and is seen as a direct deployment against India.

From the Finger 4 area of the Pangong Lake that has been the biggest flashpoint Kashgar is 690 km. The distance of Daulat Beg Oldie, India’s airfield in eastern Ladakh at more than 16,000 feet the distance to Kashgar is 490 km.

India Today's OSINT team analysed satellite images from Google Earth over the last eight months to study the changes at the airbase.

The Kashgar airport has been a dual use airport put to civilian and military use like every other border airport.

These vaults being under the Hardened Aircraft Shelters (HAS) can provide protection from direct attack as well as deny satellite/aerial observation during preparation for use of the weapons.

The construction of the underground vault started late last year, much before the India-China standoff in Ladakh, the satellite imagery indicates.

The approximate depth is 8m and a square portion under possibly two of these shelters is further dug to almost 15m depth.

In an image of November 28, 2019 some work at the air field with additional digging and 12 hardened aircraft shelters.

A former Indian Air Force officer who has been incharge of the western air command that is responsible for air operations in Ladakh as well, said earlier the aircraft were parked in the open at Kashgar.

"If shelters and underground facilities are there, then that has to be recent development. If they need to cover the aircraft and have underground facilities one can sense they are trying to keep something secret," the officer who did not wish to be identified said.

The underground vaults are weapons storage and security systems built under the floors of protective aircraft shelters.

These are built to avoid carriage of nuclear weapons from the weapon storage area or igloos to the aircraft which otherwise would require protection party during even the small movements.

These are invariably automated to protect and safeguard nuclear weapons from unauthorised use and mishandling.

The vaults generally contain two to four weapons and can be fed to the same hardened shelter or nearby shelter through automated conveyor belt system.

Sources said such underground vault seems to suggest the presence of secret weapons or nuclear warheads.

China has always been harping upon its 'No First Use' (NFU) nuclear policy but western analysts have always doubted Chinese NFU policy in almost all their assessments. Recently Federation of American Scientists had accepted that Chinese Air Force may have a role to play in its nuclear policy and execution.

### **Hardened aircraft Shelters with Possible Underground vault System**

There are twelve hardened aircraft shelters (HAS) that are clearly visible on the Eastern end of the runway as on July 6.

A large hangar possibly for an aerial early warning (AEW) aircraft is also being constructed South of the HAS.

The work on this started back in February 2020, according to a comparative analysis of the satellite imagery of the airbase.

Some, possible construction, activity is observed under tarpaulin cover in this square portion for over two months indicating specialised secretive work.

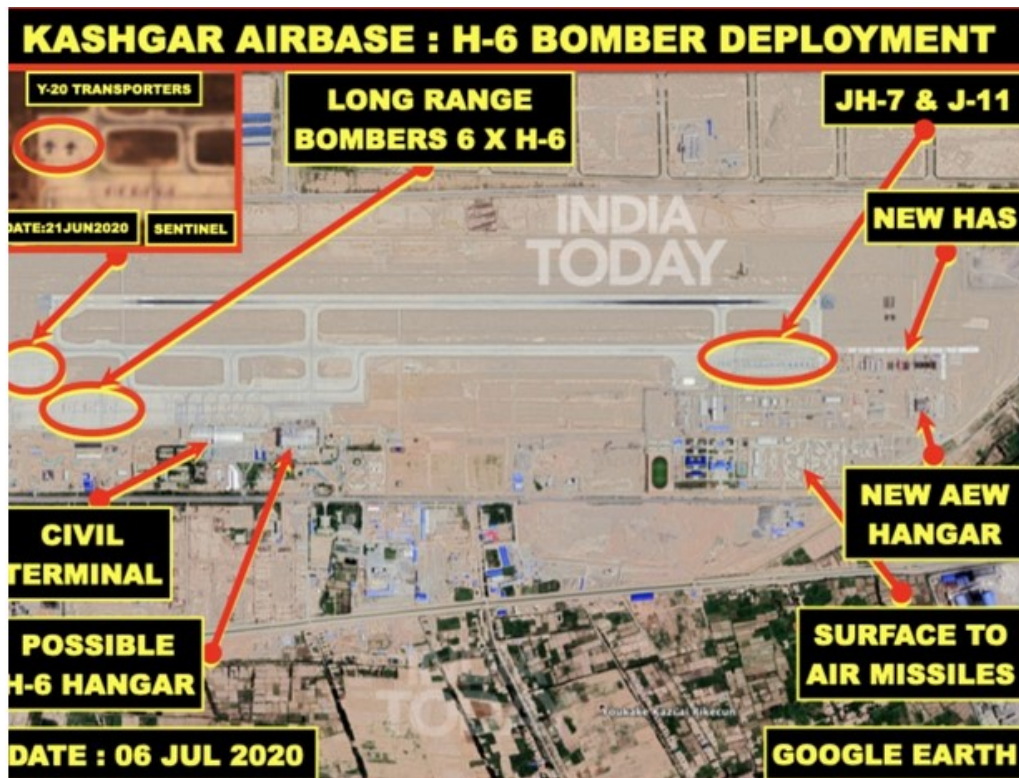
The later construction over this area gives out certain signatures that indicate a possible construction of underground vault system at this location.

Earlier, some underground work was also observed at the tarmac near Western end of taxiway. The purpose of this could not be identified yet.



### Deployment of H-6 Bomber Aircraft

The deployment of six H-6 bombers arriving at Kashgar was noticed on June 4 amid the India-China standoff in Ladakh. By then three rounds of Corps Commander level meeting had taken place to find a resolution to the tussle that started early May triggering skirmishes along with troops and arms build up by both sides. It's been 90 days since the standoff started in early May and after five rounds of top level military talks still the disengagement is not complete.



The deployment of H6 bomber aircraft has been routinely observed at in least at four airbases in the Western Theatre Command responsible for defences against India from Karakoram Pass to Arunchal Pradeh in the East.

The deployments until now although irregular indicate the capability and intentions of the PLAAF.

The Kashgar airbase has had a regular deployment of JH-7 and J-11 aircraft along with surface to air missiles since a long time but the H6 bombers were an addition.

It's interesting that the hangars for these aircraft started to come up in January this year as is seen in the satellite images reviewed by India Today.

It is clear that preparations started for their deployment earlier, much before the standoff but the aircraft were brought in once the tension peaked.

### **Armed bombers**

The satellite images show that two of the H-6 bomber aircraft have their nose, engines and front fuselage covered with red tarpaulins. The same aircraft have also been seen carrying two missiles each under its wing pylons.

This indicates very strongly that the aircraft would be carrying more bombs and or missiles under the belly or inside the bomb bays in lower fuselage.

There are twelve JH-7 and four J-11 fighter aircraft observed at the Eastern end. The JH-7 aircraft are observed carrying four missiles each and J-11 fighters are carrying two each.

### **The H-6 bomber shelter**

A large shelter of 150m width and 75m length is being constructed next to the civil terminal building.

The construction is similar to that of HAS construction compared to the digging into the ground.

The historical imagery indicates that some kind of underground work has been undertaken with at least two vents of 8m X 2m being seen at floor level.

A correct assessment of this shelter can be made probably after a month or two when more imagery is available.

### **The Strategic Transporter Y-20 Chubby Girl**

China PLAAF's latest acquisition the Y-20 strategic transporter was observed on commercial satellite imagery on June 21.

Two Y-20 aircraft were observed at the Western end of the runway parked side by side. They have not been observed again throughout the month.

The temporary deployment could be a trial for its use in this extreme weather conditions possibly testing weight carrying capacity.

### **UAV Deployment**

The Winglong-1 UCAV (unmanned combat aerial vehicle) was seen deployed at Kashgar since end of 2014 along with a fabric shelter.

The fabric shelter along with four satcom vehicles and ground control system vehicles have been observed in the latest images.

However, no UAV has been observed suggesting that they are being flown regularly to gather information.

*(Col Vinayak Bhat (Retd) is a consultant for India Today. A satellite imagery analyst, he served in the Indian Army for over 33 years)*

<https://www.indiatoday.in/world/story/china-s-kashgar-airbase-underground-vaults-hint-at-nuclear-facilities-h-6-bombers-seen-since-early-june-1707328-2020-08-03>

## Meet Tejaswi Ranga Rao, Indian Air Force's First Woman 'Wizzo'

By Kayalvizhi Arivalan

Flying Officer Tejaswi Ranga Rao is the first woman weapons systems officer in the Sukhoi-30 fleet, frontline air-dominance fighter aircraft, which is considered as the backbone of the Indian Air Force's frontline fighter jets. A weapon systems officer, also referred as 'wizzo' in the Air Force, is a flight officer responsible for all air operations and weapon systems of a military aircraft. A wizzo maintains the aircraft's system riding behind the pilot. With the appointment of Rao, India joins the list of other countries like the UK and the US, to have women wizzos in the Air Force.

After finishing schooling in Chennai, Rao's family moved to Bangalore, where she pursued BSc in Biotechnology, Chemistry and Genetics. During her BSc stint, Rao enrolled in the National Cadet Corps (NCC), which was the major reason for her to apply for the forces. Being a part of the NCC opened up the avenue of opportunities, and took Rao a step closer in achieving her goals.

Rao, the younger of the two daughters of R Ranga Rao and Radhika Ranga Rao, attributes her success to her parents, who willingly moved cities in order to enable her to fulfill her dreams. They have made sure she receives the right exposure, encouragement, motivation and support at all the crucial times. Rao also felt that nobody will point out her flaws as honestly as her family, and for that, she is grateful. "Her training as a navigator played a crucial role in her life," says Rao's mother, Radhika, who feels the training taught her to appreciate every failure just as much as she would rejoice in her successes. Rao graduated from the Navigation Training School with a President's plaque, topping the course, being the first woman to do so.



Image: Tejaswi Ranga Rao

The Indian Air Force consists of 13.9 per cent women officers – highest amongst all three forces; it is still a relatively low number. While there are only a handful of women in the flying branch as of now, tremendous opportunities exist for those who wish to grab them. "I hope to do well in the future, work hard and serve my nation in the best way I can," Rao had mentioned in her personal blog.

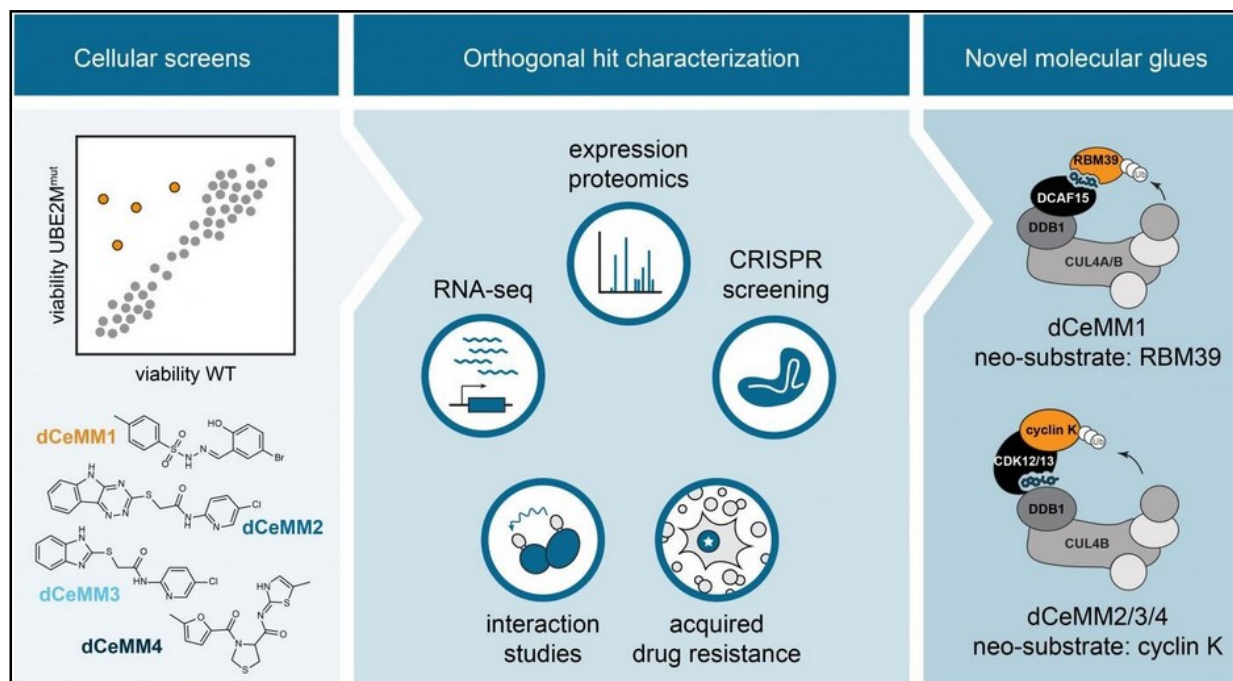
"We allow our daughters to follow their dreams and make their own path. We did not think much when she discussed her ambition and career path with us. In fact, we were proud that she has chosen an altogether different profession and came out among the three girls selected by the Air Force in the entire country under the flying wing. Gender had never been a hindrance to my daughter's dreams," concludes the proud mother.

"We allow our daughters to follow their dreams and make their own path. We did not think much when she discussed her ambition and career path with us. In fact, we were proud that she has chosen an altogether different profession and came out among the three girls selected by the Air Force in the entire country under the flying wing. Gender had never been a hindrance to my daughter's dreams," concludes the proud mother.

<https://www.femina.in/trending/achievers/meet-tejaswi-ranga-rao-indian-air-forces-first-woman-wizzo-166228.html>

## Drug discovery: First rational strategy to find molecular glue degraders

Despite enormous efforts to advance traditional pharmacology approaches, more than three quarters of all human proteins remain beyond the reach of therapeutic development. Targeted protein degradation (TPD) is a novel approach that could overcome this and other limitations, and thus represents a promising therapeutic strategy. TPD is based on small molecules, generally called 'degraders,' which can eliminate disease-causing proteins by causing their destabilization. Mechanistically, these degrader drugs repurpose the cellular protein quality control system, tweaking it to recognize and eliminate harmful proteins. In detail, they re-direct members of the protein family of E3 ubiquitin ligases (E3s) towards the disease-causing target protein. This leads to a "molecular earmarking" of the harmful protein via a process called 'ubiquitination.' Subsequently, the ubiquitinated protein is recognized and degraded by the molecular machine called the proteasome, which serves as the cellular garbage disposal system.



**Figure 1** Cellular viability screens nominated potential molecular glues. Orthogonal investigation of the leading molecules (dCeMM1/2/3/4) enabled the characterization of novel molecular glue degraders that recruit two different E3 ligases to induce the degradati

In this study, CeMM researchers turned their focus to a subset of degraders called 'molecular glue degraders.' This class of seemingly rare small molecules that has been shown to induce the degradation of target proteins that could not be blocked via ways of traditional pharmacology. Consequently, these proteins had been termed 'undruggable.' The best characterized examples are the clinically approved thalidomide analogs, effective for the treatment of different blood cancers. Unfortunately, the discovery of the few described molecular glue degraders has historically been a process entirely driven by serendipity, and no rational discovery strategies existed.

To overcome this limitation, Georg Winter's group at CeMM set out to innovate a scalable strategy towards the discovery of novel molecular glue degraders via phenotypic chemical screening. To this end, first author and CeMM postdoctoral fellow Cristina Mayor-Ruiz and colleagues engineered cellular systems widely impaired in E3 activity. Differential viability between these models and E3-proficient cells was used to identify compounds that depend on active E3s, and therefore, potential molecular glue degraders. Researchers integrated functional genomics with proteomics and drug-interaction strategies, to characterize the most promising compounds. They validated the approach by discovering a new RBM39 molecular glue degrader, structurally similar to others previously described. Importantly, they discovered a set of novel molecular glues that induce the degradation of the protein cyclin K, known to be essential in many different cancer types. Interestingly, these novel cyclin K degraders function via an unprecedented molecular mechanism of action that involves the E3 CUL4B:DDB1 and that has never been therapeutically explored before.

This study, performed in close collaboration with CeMM PI Stefan Kubicek, thus provides the first framework towards the discovery of molecular glue degraders that can be highly scaled, but also strongly diversified. "I truly believe that we are only scratching the surface of possibilities. This study is chapter one of many chapters to follow. We will see a revolution in the way researchers perceive and execute therapeutic strategies for previously incurable diseases by crafting glue degrader strategies that will enable them to eliminate therapeutic targets that could not be explored with traditional pharmacologic approaches", says CeMM PI and last author of the study Georg Winter.

**More information:** Cristina Mayor-Ruiz et al. Rational discovery of molecular glue degraders via scalable chemical profiling. *Nature Chemical Biology* 3 June 2020. DOI: [10.1038/s41589-020-0594-x](https://doi.org/10.1038/s41589-020-0594-x)

**Journal information:** [Nature Chemical Biology](https://phys.org/news/2020-08-drug-discovery-rational-strategy-molecular.html)  
<https://phys.org/news/2020-08-drug-discovery-rational-strategy-molecular.html>



*Tue, 04 Aug 2020*

## Light shines on chemical production method

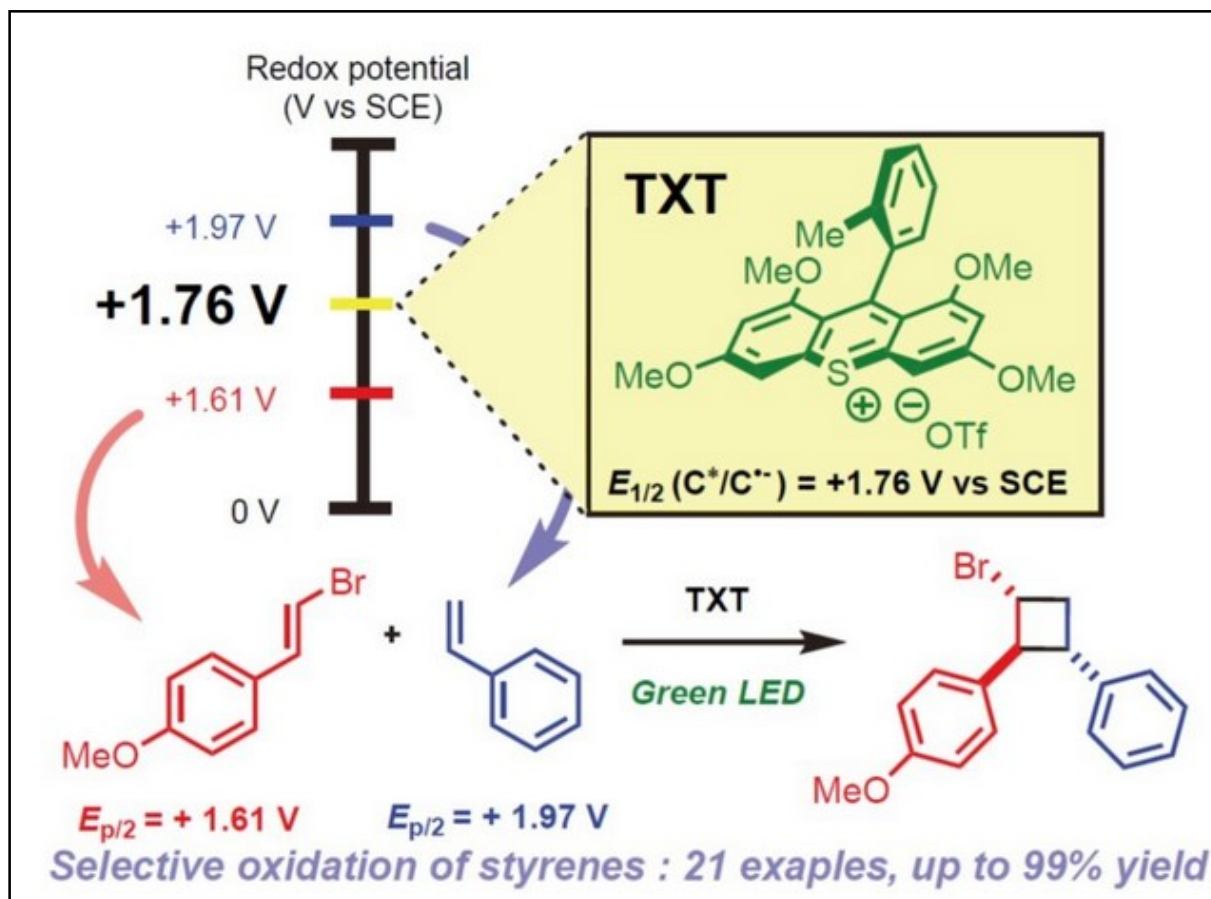
A team of researchers from Japan has demonstrated a light-based reaction that yields high numbers of the base chemical component required to produce bioactive compounds used in common industry products. They published their results on June 11 in *Organic Letters*.

"We developed a redox potential-controlled and cost-effective method to synthesize multisubstituted cyclobutanes, which are present in the core structure of various products and bioactive components," said paper author Yujiro Hoshino, a research associate at Yokohama National University.

Cycloaddition reactions allow to prepare carbocyclic and heterocyclic organic compounds with atom-efficiency. For a long time, researchers carried out photocycloadditions of olefins such as styrenes, a chemical used in the production of plastics and rubber, by treating them with high-energy ultraviolet light or transition metal catalysts, which are known to be toxic and expensive chemical reagents. The reaction mainly provides homo-dimers, not hetero-dimers. In addition, the powerful light damages the bonds holding the chemical together, allowing it to break apart and reform in a new configuration, known as a cyclobutene ring.

Redox potential refers to how easily a chemical loses or gains electrons. Hoshino and co-workers took advantage of this characteristic and applied a green, visible light to styrenes situated in a two-by-two arrangement, allowing the chemical components and bonds to selectively reorganize as the light freed electrons from the styrenes. The newly organized chemical components were multisubstituted cyclobutanes.





The picture illustrates the redox potential controlled selective oxidation of styrenes for regio- and stereoselective crossed intermolecular [2 + 2] cycloaddition via organophotoredox catalysis. Credit: Yujiro Hoshino, Yokohama National University

"By focusing on the different redox potential between various styrenes and optimizing our light catalysts, we developed a mild and clean method to synthesize multisubstituted cyclobutanes," Kenta Tanaka, paper first author and an assistant professor at Tokyo University of Science, said.

"Emphasis will be placed on the strategy which shows the potential to synthesize multisubstituted cyclobutanes via radical cation species without any transition metal catalysts," said another corresponding author Kiyoshi Honda, a professor at Yokohama National University.

Next, the researchers plan to expand the use of various visible-light catalysis methods.

"We hope our reaction system provides an efficient and new method for green-light-driven organic chemical reactions, and that we continue to contribute to the field," Hoshino said.

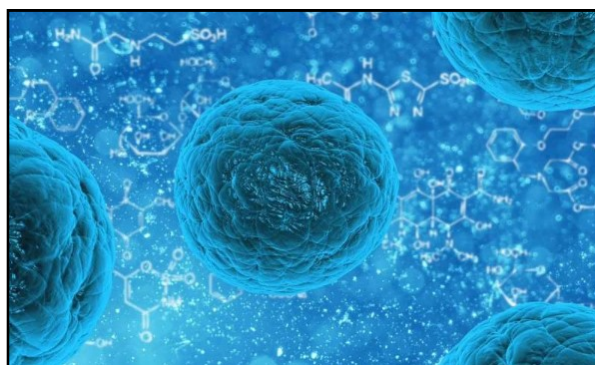
**More information:** Kenta Tanaka et al, Redox Potential Controlled Selective Oxidation of Styrenes for Regio- and Stereoselective Crossed Intermolecular [2 + 2] Cycloaddition via Organophotoredox Catalysis, *Organic Letters* (2020). DOI: [10.1021/acs.orglett.0c01852](https://doi.org/10.1021/acs.orglett.0c01852)

**Journal information:** *Organic Letters*  
<https://phys.org/news/2020-08-chemical-production-method.html>

## Cells relax their membrane to control protein sorting

The tension in the outer membrane of cells plays an important role in a number of biological processes. A localized drop in tension, for example, makes it easier for the surface bend inward and form invaginations that will become free vesicles inside the cell. These are delimited by a membrane that contains all proteins originally present in the invaginations. A fundamental function of these so-called endosomes is to sort proteins to their cellular destination, e.g., reuse or degradation. Are the functions of endosomes modulated by variations in tension?

Scientists from the University of Geneva (UNIGE) and the Chemical Biology National Center of Competence in Research have answered in the affirmative, thanks to their high-precision research published in the journal *Nature Cell Biology*. Using molecular probes that they devised themselves, the multidisciplinary team has measured the membrane tension of the endosomes that form part of the cell's sorting center, and demonstrated that this relaxation helps form vesicles within endosomes, i.e. vesicles within



Credit: CC0 Public Domain

vesicles or "intraluminal vesicles," which carry the proteins to be degraded. It is a discovery of fundamental importance that could have implications in the field of cancer and degenerative diseases.

How can chemical tools be used in real time to measure the physical properties of a cell's internal structures while still alive? This is one of the challenges that the National Center of Competence in Research (NCCR) Chemical Biology has been trying to meet since it was launched in 2010. To reach this goal, a team from the NCCR developed molecular probes that have the capacity to penetrate cells and bind selectively the membrane of some organelles (mitochondria, endoplasmic reticulum, lysosomes, etc.) that function in the depth of the cytoplasm. One of the special features of these microscopic tools is that they change their fluorescence when they are distorted by a variation in the tension of the membrane in which they are inserted.

### Garbage bags

The first physiological process that the research team decided to study using this new tool was the formation of intraluminal vesicles (ILVs) inside an organelle. These ILVs can be compared to tiny garbage bags that contain the proteins and other compounds that need to be processed. Endosomes then transport ILVs to the lysosomes, which are the cellular power plants for destroying and recycling waste from the cells. The aim of the Geneva study was to determine whether a drop in the tension of the organelle's membrane may be responsible for the formation of the ILVs, and thus whether protein sorting in the cell is regulated by the membrane physical properties.

"We submitted our cells to a hypertonic shock, meaning we increased the concentration of the solutes (compounds in solution) in their environment," says Vincent Mercier, a researcher in the Department of Biochemistry in UNIGE's Faculty of Science and the article's first author. "In response, cells expelled water to equilibrate solutes concentrations in and out of the cell. Their volume decreased as a result, as did the tension of the membrane. Using our probes, we observed that the membrane of the endosomes relaxed in the same way as the membrane of the entire cell."

Better still, this drop in tension was accompanied by the mobilization on the surface of the organelles of the compounds needed to form a complex (called ESCRT-III) that is exactly the main molecular machine required to produce ILVs. A different experiment correlated these findings with actual ILV production.

### Tension control

"We also exposed our cells to epidermal growth factors (EGFs), which we know trigger the production of ILV after a cascade of reactions," says Aurélien Roux, professor at UNIGE's Department of Biochemistry. "Using the same probes, we were able to calculate that this process is also accompanied by a drop in the tension of the organelle membranes. These results, obtained thanks to a multidisciplinary collaboration combining skills in biology, chemistry and physics, leads us to conclude that the tension of the membrane controls the functions of the organelles."

It is an important conclusion since the formation of ILV from the membrane of the endosomes is a process that is essential for the proper functioning of the cells. In the specific case of this study, this biomechanical apparatus can be used to trap and quickly destroy the EGFs, thereby interrupt the signal delivered by this growth factor before it gets carried away. A disturbance in this control mechanism is often associated with the onset of cancer or degenerative diseases.

**More information:** Endosomal membrane tension regulates ESCRT-III-dependent intra-luminal vesicle formation, *Nature Cell Biology* (2020). DOI: [10.1038/s41556-020-0546-4](https://doi.org/10.1038/s41556-020-0546-4), [www.nature.com/articles/s41556-020-0546-4](https://www.nature.com/articles/s41556-020-0546-4)

**Journal information:** *Nature Cell Biology*  
<https://phys.org/news/2020-08-cells-membrane-protein.html>



Tue, 04 Aug 2020

## Scientists identify new catalysts for more efficient water splitting

A team of scientists led by Nanyang Technological University, Singapore (NTU Singapore) have discovered the parameters that determine the efficiency of a class of low-cost catalysts called spinel oxides—a discovery that breaks a bottleneck in the extraction of hydrogen from water through electrolysis, the process of splitting water with electricity.

A major challenge of this process lies in the energy loss as the chemical reactions involved in water electrolysis take place, driving up the cost to produce hydrogen through this method. Catalysts are therefore necessary to speed up these chemical reactions.

Spinel oxides, which are typically made of cheap transition metals, have garnered interest in recent years as a stable, low-cost catalyst that could overcome this challenge, but the design of high-performing spinel oxides has been hampered by the lack of understanding of how they work.

Now, NTU Singapore's Associate Professor Jason Xu Zhichuan and his team have made two important advances. They have unraveled, at the atomic scale, how spinel oxides work to speed up



To improve the performance of spinel oxides, a deeper understanding of how they work as catalysts to make water electrolysis more efficient is needed. By identifying the parameters that make spinel oxides good catalysts for this process, the NTU-led team can now create new, better spinel oxides based on these parameters, bringing us one step closer to a hydrogen-powered economy. Credit: NTU Singapore

water electrolysis. Primed with that new understanding, the team then used machine learning to select new spinel oxides with increased catalytic activity, making water electrolysis more efficient.

These findings bring the team a step closer to making water splitting a suitable approach for large-scale manufacture of hydrogen gas, which has been highlighted by the Energy Market Authority as one possible low-carbon alternative for reducing Singapore's carbon footprint as it targets to halve its peak greenhouse gas emissions by 2050. This is in line with global trends—the European Union, for instance, recently unveiled its hydrogen strategy as an important part of the solution to meet the 2050 climate neutrality goal of the European Green Deal.

Associate Professor Xu of the NTU School of Materials Sciences and Engineering said: "To improve the performance of spinel oxides, we need a deeper understanding of how they work as catalysts to make water electrolysis more efficient. Now, by identifying the parameters that make spinel oxides good catalysts for this process, we can create new, better spinel oxides based on these parameters, bringing us one step closer to a hydrogen-powered economy."

The findings were published in scientific journal *Nature Catalysis* in July.

### **A step closer to a hydrogen-fuelled economy**

Extracting hydrogen from water electrolysis, when powered by renewable energy sources such as wind or solar energy, is an attractive approach to produce hydrogen fuel, which has the potential to replace fossil fuels used in power plants, transport, and the process of bunkering.

Hydrogen is also attractive as a viable alternative to traditional energy storage options such as lithium ion batteries, which gradually lose their charge over time.

The water electrolysis process takes place in an electrolyser, where two main chemical reactions take place as water is split: one result in hydrogen production, while the other leads to oxygen production, and the two gasses are kept separate by a membrane.

Assoc Prof Xu, who is also part of NTU's Energy Research Institute, said the main bottleneck lies in the chemical reaction that leads to oxygen generation from the other side known as the oxygen evolution reaction.

He said: "The oxygen evolution reaction is critical to the efficiency of devices that split water to produce hydrogen fuel, but it is also a sluggish chemical reaction that lowers the overall energy conversion efficiency. This is why we need catalysts such as metal oxides to speed things up."

While precious metal oxides have proven to be state-of-the-art catalysts that reduce energy consumption and enhance energy conversion efficiency, their scarcity, high cost and poor durability have limited their application at large scale.

Spinel oxides, with their low cost and availability in abundance, could become a viable alternative if they were designed with the right parameters, such as the type of transition metal in the spinel oxide, to increase catalytic activity, said Assoc Prof Xu.

Based on key parameters that the team had identified, the team trained a machine learning model with a dataset of over 300 spinel oxides in order to screen and predict the efficiency of any spinel oxide catalyst in a matter of seconds.

Using this method, the team found that a new oxide comprising manganese and aluminum was predicted to show superior catalytic activity. This was validated experimentally.

Assoc Prof Xu said: "While the ability to design highly efficient catalysts greatly pushes forward the technique of water electrolysis in hydrogen production, there are two other major bottlenecks we have to look at before widespread adoption of this technique is possible. Firstly, we have to improve the membrane in such alkaline electrolysers to support long-term hydrogen production. When that's done, then we can work with our engineering colleagues to see how we can put all of these upgrades into an electrolyser that can function on an industrial level."

**More information:** Yuanmiao Sun et al. Covalency competition dominates the water oxidation structure–activity relationship on spinel oxides, *Nature Catalysis* (2020). [DOI: 10.1038/s41929-020-0465-6](https://doi.org/10.1038/s41929-020-0465-6)

**Journal information:** [Nature Catalysis](https://phys.org/news/2020-08-scientists-catalysts-efficient.html)  
<https://phys.org/news/2020-08-scientists-catalysts-efficient.html>

### Covid-19 vaccine tracker, August 3: Why so many vaccines are being developed

*Coronavirus (COVID-19) vaccine tracker update: Shouldn't everyone collaborate to produce just one effective vaccine, and concentrate our efforts in ensuring that it is made available to all?*

Pune: According to the latest list of the World Health Organisation, at least 165 vaccines for novel Coronavirus were being developed across the world. There are possibly more, but still in the early stages, and not listed by WHO. Those that are listed have all entered at least the pre-clinical trials stage. Some of them are in the final stage of human trials, possibly only a few months away from hitting the market (a Russian vaccine promises to be ready in weeks, if not in days), while many others are just getting into animal trials, and are perhaps a couple of years away from becoming ready.

But why are so many vaccines being developed? Do we need so many Coronavirus vaccines? Wouldn't one be enough? Wouldn't the first one to hit the market make others redundant? Aren't then we wasting huge amount of money and resources in duplicating efforts? Shouldn't everyone collaborate to produce just one effective vaccine, and concentrate our efforts in ensuring that it is made available to all?

Here are some possible answers.

#### **Vaccines fail. Vaccine development has a very low success rate**

It might not be evident in the context of the current pandemic, when so many companies and research laboratories are rushing to produce a vaccine, but vaccine development is an incredibly complex, time-consuming, resource-intensive process. Besides, it is also a very high-risk process. The chances of success are extremely low.

Out of the 100 that are considered in the research laboratories as potential candidates, barely 20 make it to the pre-clinical trial stage. This means almost 80 per cent of the candidates are not even considered suitable to be tried on animals. Then, not more than five of the original lot are approved for human trials, and out of these, not more than one or two stand a chance of being approved for public use.

In the current context, the 165 candidates listed in the WHO survey have all reached at least the pre-clinical trial phase. And, at least 23 of them are in human trials. Not all of these will be successful. Going by past record, only about one-fourth of the candidates in pre-clinical trials would be adjudged worthy of getting into human trials. The others would be weeded out.

Though we are all being given to understand that it was only a matter of a few months before some of the leading candidates, like that being developed by the Oxford University, would be available in the market, the reality is quite different. Even those that are in the final stages of human trials, with encouraging results from previous stages, are not guaranteed to succeed. In fact, phase-III trials in which the candidate vaccine is tested for its ability to prevent in the infection in



As they race against time to produce a vaccine, research groups across the world are testing several cutting-edge technologies in vaccine development. (Getty Images)

human body in real life situations (outside laboratory condition), are the toughest part of the trial. If they fail to effectively prevent the disease, these vaccines could still lose out.

Countries with robust regulatory systems are unlikely to lower their bar just because of the prevailing emergency. The effectiveness of the vaccine in phase-III trials is crucial.

In the end, we are not staring at a possibility of hundreds of Coronavirus vaccines. May be only five or six would succeed. Even that would be considered a very good success rate.

### **The world needs multiple Coronavirus vaccines**

Considering the prevailing situation in which everyone would want to get their hands on the vaccine as quickly as possible, one vaccine is unlikely to meet the immediate global demand. There are already indications that some countries may corner a bulk of the new vaccines, while the others are left to wait for them to become available at a later date. The United States, for example, has already entered into billion-dollar agreements with multiple leading contenders, booked hundreds of millions of doses in advance. This could potentially deprive the other countries, especially in the developing and poor world, from access to vaccines.

That is why several countries have started their own initiatives at developing the vaccine. Countries like Egypt, Thailand, Nigeria, Argentina, not exactly known for vaccine research, are all in the race. Even if they are a little late, if successful, they would have control over production and supply of these vaccines.

There is another reason why multiple vaccines would be needed. As pointed out by Serum Institute's Adar Poonawala as well, there is no guarantee that the first vaccine would be the most effective. These vaccines are being developed in haste, and there is every likelihood that the ones that come later are able to learn from the experiences of the earlier ones, and make modifications to become more effective.

In addition, the global demand for vaccines would be such that it would easily be able to absorb the production costs of multiple vaccines.

### **New technologies being tried**

As they race against time to produce a vaccine, research groups across the world are testing several cutting edge technologies in vaccine development, some of which have never succeeded in delivering a final product. For example, a DNA or RNA-based approach to produce a vaccine has not succeeded till now. But these approaches are being tried out to develop a Coronavirus vaccine, because they are potentially quicker and easier to make.

In these kinds of approaches, the genetic material of the virus (either DNA or RNA) is injected inside the human body to trigger an immune response. In other traditional approaches, that have succeeded in the past, scientists inject weakened live virus, or a dead virus, or a key protein of the virus inside human bodies to trigger immune response.

The deployment of these relatively new technologies to produce a vaccine has increased the number of candidates being developed.

### **Fund availability**

This is crucial. Vaccine development is a very costly endeavour, requiring hundreds of millions of dollars. In normal times, only big pharmaceutical giants with deep pockets and risk appetite, or institutions with large research grants get into vaccine development.

The situation is dramatically different in the current pandemic, however. From governments to donor agencies to multinational corporations to international health initiatives, all have opened their purse strings for a Coronavirus vaccine. Every candidate that shows promise in the laboratories is being backed. Many companies and institutions are actually developing multiple candidates.

It's a high risk game, but can turn out to be extremely rewarding for those who succeed. Many research groups are in this for the learning experience as well.

## Hunt for Coronavirus Vaccine: The Story So Far

- More than 160 vaccine candidates in pre-clinical or clinical trials
- 23 of them in clinical trials
- Six in final stages, phase-III of human trials
- At least eight candidate vaccines being developed in India. Two of these have entered phase-I human trials.

(Source: WHO Coronavirus vaccine landscape of July 31, 2020)

<https://indianexpress.com/article/explained/covid-19-vaccine-updates-6536653/>

# Business Today

Tue, 04 Aug 2020

## BT Buzz: Govt slack on national vaccination plan; companies wonder how much to set aside for India!

*Indian vaccine manufacturers are waiting for a vaccination plan from the government so that they can set aside stocks of vaccines when they are approved for production*

*By Joe C Mathew*

### KEY HIGHLIGHTS

- *Serum Institute, Bharat Biotech, Zydus conducting clinical trials of potential COVID vaccines*
- *Regulatory streamlining ensures quick approvals, fast-track development*
- *Early 2021 a realistic target for made in India vaccine*
- *Developed nations firm up plans for vaccine procurement, administration, India waits*
- *With 18 lakh infections, India emerging as a global COVID-19 hotspot*

Drugs Controller General of India (DCGI) has given approval to Pune-based Serum Institute to conduct the second and third phases of clinical trials simultaneously of the potential COVID-19 vaccine Covishield developed by the Oxford University-AstraZeneca collaboration in the UK. This is the third vaccine candidate that has received approval for clinical trials from the DCGI in quick succession. Earlier approved ones, Covaxin and ZyCov-D, potential vaccines developed by Hyderabad-based Bharat Biotech and Ahmedabad-based Zydus Cadila respectively, are undergoing simultaneous Phase I and II clinical trials in various centres across the country at the moment. The companies are hoping that if everything goes well, they may be ready for the commercial launch of a COVID-19 vaccine in less than a year.

### ON FAST TRACK

The speed at which all three vaccines have reached the clinical trial stage in India is unprecedented. The companies have been working overtime to zero in on the most promising vaccine candidate, and the regulator has wasted no time in granting necessary clearances. The permission to conduct simultaneous trials has also helped cut short time as, under normal conditions, approvals for each phase would have been only on the basis of the outcome of the previous phase of clinical trials.

For instance, the first vaccine project to take off, the partnership project of Bharat Biotech International Ltd (BBIL) and Indian Council of Medical Research (ICMR) to develop Covaxin, started with ICMR's National Institute of Virology (NIV) in Pune isolating the COVID-19 virus in their lab early this year, in the very initial stages of the pandemic itself. It was handed over to BBIL to identify and develop a vaccine candidate, a whole virus inactivated vaccine. The company, which has the country's only BSL-3 (bio-safety level) containment facility in the private sector to conduct such research, came out with a potential vaccine candidate within the next two to three

months. The research work happened 24x7, and pre-clinical tests carried out in animals showed the vaccine is safe and it produces anti-bodies. The results were submitted to the DCGI and got cleared to be taken to the next level - the clinical trials in human volunteers. The hospitals or clinical trial sites were identified, they were asked to get their protocols ready, volunteers recruited, to begin clinical trials.

At the same time, BBIL sent samples of the vaccine candidate to Central Drugs Laboratory, Kasauli, where samples from every batch of vaccine - not just experimental vaccines, but even the ones that have obtained manufacturing licenses, gets tested for quality on a routine basis. The test results from Kasauli, which can take months depending on their workload, got prioritised and hence were completed within days. All the administrative procedures, which would have taken several years in a non-pandemic situation, thus got over within months.

ZyCov-D development has also followed a similar fast track. Pankaj R Patel, chairman of Zydus Cadila, has publically acknowledged the support of National Biopharma Mission, BIRAC, Department of Biotechnology, Government of India, ICMR and DCGI in the development of ZyCoV-D vaccine candidate. Zydus launched its accelerated vaccine development programme for COVID-19 in February 2020. The first human dosing as part of the adaptive Phase I/ II human clinical trials of ZyCoV-D, a plasmid DNA vaccine, happened on July 15. The DNA vaccine platform, on which ZyCoV-D is developed, uses non-replicating and non-integrating plasmid carrying the gene of interest, making it safer to handle.

Serum Institute, the production partner of Oxford University-AstraZeneca vaccine Covishield will also thank the regulator as the pre-clinical (based on studies of experimental animals) and Phase I clinical trial data generated outside India was considered while allowing the company to initiate the next levels (Phase II and III) of clinical trials in the country.

Phase I clinical trial is conducted to demonstrate safety of the vaccine. Once that is done, a Phase II trial to prove the efficacy of the vaccine takes place. After that is also successfully done, comes the Phase III to demonstrate efficacy of the vaccine in larger number of volunteers across multiple sites. The actual involvement of human volunteers and drawing of blood samples in the first and second phases gets over within a month each. It was the pandemic situation, and the urgency to fast track clinical trials, that made DCGI permit clinical trial sites to carry out Phase I+II trials, which means to conduct the first and second phases of clinical trial in parallel. Assuming that all clinical trial sites start administering the vaccine doses to the volunteers according to the protocols approved by the DCGI today (in the case of Covaxin and ZyCoV-D its already on), within a month, the samples collected at all the sites during the clinical trials can be sent to a NABL-approved diagnostic laboratory for testing. By then the Principal Investigators would have observed whether the vaccine is safe or not to the volunteers by observing them and checking whether they are developing any adverse reaction or effects (Phase I results).

The results of the second phase will indicate if the vaccine promoted development of antibodies. Depending on the urgency, the test results can come within 48 hours. The analysis of this data and preparation of final report by the clinical trial investigators for submission to the DCGI is the next step. This gathering of data, writing the reports and their submission, etc. to the DCGI can sometimes take months as the investigators involved are also busy medical professionals. ICMR had made an appeal to the investigators to prioritise these works and if it is heeded, reports can be prepared and submitted to the DCGI in a couple of weeks, instead of six months or more. The role of DCGI will then be to go through these reports and decide on the next regulatory step towards release of the vaccine for use.

Depending on the data of the Phase II vaccine trials, DCGI can permit the third phase of clinical trials. In the case of Covishield, the results of Phase III clinical trials along with its Phase II results may see DCGI even giving marketing approval. If there are no delays in clearances and preparation of protocols, enrolments, tests and reports, and if the results are robust, India can hope for a vaccine within a year.



## READYING FOR THE LAUNCH

Indian vaccine makers are not the only ones who are working on COVID-19 vaccines. In fact, the World Health Organisation (WHO) itself is spearheading the global efforts to initiate as many accelerated vaccine development projects as possible. As on July 31, 26 vaccine candidates (including Covishield, Covaxin and ZyCoV-D) are in Phase III or Phase II stage of clinical trials. Another 139 candidate vaccines are undergoing pre-clinical evaluation. Indian companies may not be the frontrunners, but there is nothing much to complain about when it comes to their preparedness to launch the product, once it is found to be successful. But what differentiates India from other countries, especially the developed world, is the absence of any financial commitment from the government towards securing the vaccine on a priority basis once the vaccine becomes a reality.

Several developed nations have already committed billions of dollars to ensure the availability of vaccine. Deals are being signed with pharmaceutical companies like AstraZeneca and Pfizer to ensure that the vaccine doses are reaching their citizens in sufficient quantity. The US, which tops the list of COVID-19 infections with over 48 lakh cases, has made this commitment. India, where every day over 50,000 new cases are registered and is third in the global list of COVID-19 affected countries with over 18 lakh cases, is yet to make its plan clear. Any attempts to fast track the development will have to be matched with efforts to make the vaccine available at affordable costs.

Serum Institute promoter Adar Poonawalla has said that the company's newly built COVID-19 vaccine production facility can set aside half of its production capacity for domestic use, but the government is yet to have its mass vaccination plans in place. Though the priority targets for vaccination - the vulnerable population like frontline healthcare workers, people with other health conditions, etc. - have been more or less spelt out.

With COVID-19 cases increasing day by day, it is time for a vaccination plan. At least a blueprint that can suggest the way for the vaccine industry to firm up their India plans.

<https://www.businesstoday.in/sectors/pharma/missing-covid-19-vaccination-plan-dampens-india-fast-track-vaccine-development-efforts/story/411887.html>



Tue, 04 Aug 2020

## Oxford COVID-19 vaccine to start advanced trial in India soon. How it will work

- *Around 1,600 people will participate in the clinical human trial of the COVID-19 vaccine developed by the University of Oxford*
- *All eyes are on Oxford's coronavirus vaccine as it has already shown promising results in the first phase of clinical human trial*

India's apex drug regulatory body has granted approval to Serum Institute of India (SII) to conduct phase II and III human trial for the COVID-19 vaccine developed by the University of Oxford. The permission was given on Sunday after an evaluation based on the recommendations of the Subject Expert Committee on COVID-19, a health ministry official told.

"The firm has to submit safety data, evaluated by the Data Safety Monitoring Board (DSMB), to the CDSCO before proceeding to phase 3 clinical trials," a senior official told the news agency PTI.

The officials said that the SII had submitted a revised proposal on Wednesday after the expert panel on Tuesday had asked it to revise its protocol for the phase II and III clinical trials.

The panel had recommended that the human trial sites for the study should be distributed across the country. Around 1,600 people will participate in the clinical trial. Volunteers must be above 18 years old to take part in the study. Serum Institute has selected 17 institutions to conduct the the advanced trials. These sites are AIIMS-Delhi, B J Medical College in Pune, Rajendra Memorial Research Institute of Medical Sciences (RMRIMS) in Patna, Post Graduate Institute of Medical Education and Research in Chandigarh, AIIMS-Jodhpur, Nehru Hospital in Gorakhpur, Andhra Medical



AstraZeneca has partnered with SII to develop COVID-19 vaccine for India and low-to-middle income countries (AP)

College in Visakhapatnam and JSS Academy of Higher Education and Research in Mysore.

"As per the study design, each subject will be administered two doses four weeks apart (first dose on day one and second dose on day 29) following which the safety and immunogenicity will be assessed at predefined intervals," the official told *PTI*.

"According to the application, it would conduct an observer-blind, randomised controlled study to determine the safety and immunogenicity of 'Covishield' on healthy Indian adults," the official said, according to *PTI*.

The COVID-19 vaccine candidate has been developed by the University of Oxford and British-Swedish firm AstraZeneca. At present, phase II and II clinical trials of the Oxford vaccine candidate is going on in the United Kingdom, phase II clinical trial in Brazil and phase I and II clinical trials in South Africa. AstraZeneca has partnered with SII to develop COVID-19 vaccine for India and low-to-middle income countries.

All eyes are on Oxford's coronavirus vaccine as it has already shown promising results in the first phase of clinical human trial. The researchers said that they found their experimental COVID-19 vaccine produced a dual immune response in people aged 18 to 55. "We are seeing good immune response in almost everybody," said Dr Adrian Hill, director of the Jenner Institute at Oxford University. "What this vaccine does particularly well is trigger both arms of the immune system," he said.

Indian drugmaker Wockhardt Ltd will supply millions of doses of multiple COVID-19 vaccines to the UK, including the one being developed by AstraZeneca and Oxford University, it said. The company has reserved fill-and-finish capacity — the final manufacturing step of putting vaccines into vials or syringes and packaging them - as part of an agreement with the UK government, it said.

<https://www.livemint.com/news/india/oxford-covid-19-vaccine-to-start-advanced-trial-in-india-soon-how-it-will-work-11596446929294.html>

# STAR OF MYSORE

Tue, 04 Aug 2020

## JSS Hospital shortlisted for COVID vaccine, drug trials

*Clinical trial to evaluate if Covishield vaccine can prevent symptomatic Coronavirus Disease 2019 (COVID-19)*

Mysore/Mysuru: Mysuru's JSS Hospital and Medical College has been shortlisted by Indian Council of Medical Research (ICMR) for Serum Institute of India's COVID-19 vaccine candidate — Covishield — trial. The clinical trial is designed to evaluate if an investigational vaccine can prevent symptomatic Coronavirus Disease 2019 (COVID-19) in adults.

The institution has also been shortlisted for oral medicine trial of a private pharmaceutical company. JSS, with its advanced facilities and an exclusive COVID-19 Testing Laboratory, is the second hospital in Karnataka that has been shortlisted to take up the COVID-19 vaccine trials. The other institute is Jeevan Rekha Hospital, Belagavi which has been chosen for human trials of Covaxin, another vaccine candidate.



In a latest development this morning, the Drugs Controller General of India (DCGI) has given approval to Serum Institute of India for conducting phase II and III clinical trials of Oxford University-AstraZeneca vaccine against Coronavirus disease in the country, the Union Ministry of Health & Family Welfare (MoH&FW) said.

A senior official in the Central Drugs Standard Control Organisation (CDSCO) said, “The subject expert committee that went through the data and protocol submitted for the trial was satisfied with the results and based on their opinion the DCGI permitted its trial in India.”

On July 20, the initial trial results for the vaccine candidate, Covishield, which were made public by Oxford University, had shown promising results. The preliminary trial results published in the medical journal ‘The Lancet’ said that the vaccine candidate was safe and induced immune reaction against SARS-CoV-2, which causes Covid-19, and protect healthy people from infection.

Speaking to Star of Mysore this morning, Dr. H. Basavana Gowdappa, Principal of JSS Medical College said that the ICMR had examined the records and facilities of the JSS Hospital and had shortlisted the institute for trials. “We cannot divulge any details now as things are not finalised. The trials will be to prevent symptomatic Coronavirus Disease. That’s what we know as of now and we received the shortlisted news a few days back,” he said.

Hospital sources said that the ICMR evaluated the facilities of the hospital and most likely, the institute will make the cut in Karnataka. “Samples will be sent to JSS Hospital once the preliminary process is completed at the Serum Institute. This apart, the IMCR has selected the hospital for the trials of an oral drug for COVID-19 too.

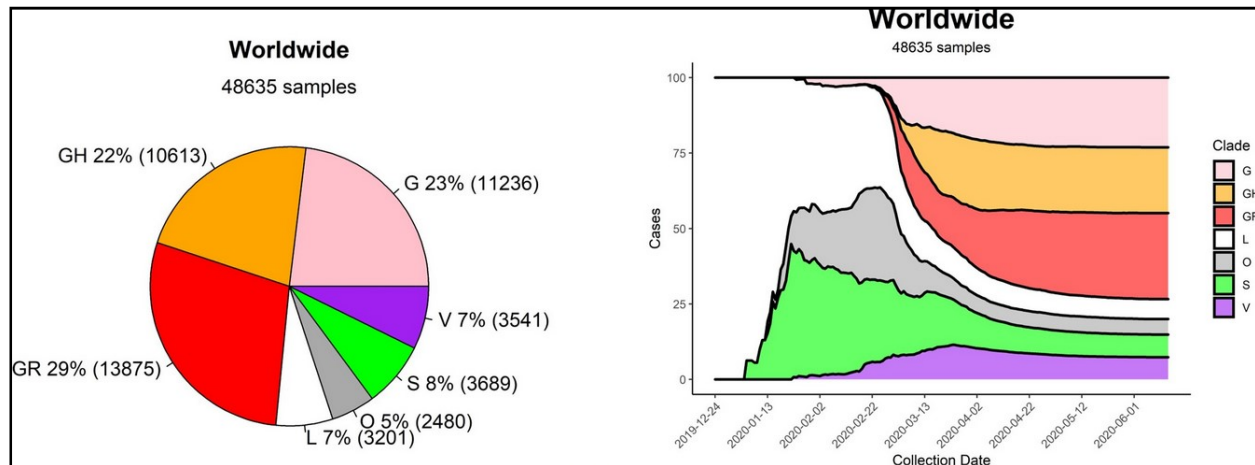
Now that the Drugs Controller General of India has approved the clinical trials, the Serum Institute of India will be able to kick-off the trials, effectively putting it ahead in India’s own race for a COVID-19 vaccine.

Serum Institute of India has a tie-up with Swedish-British firm AstraZeneca, which developed the vaccine along with The University of Oxford, to manufacture this vaccine for low-and middle-income countries. The firm plans to conduct its phase II/III trials on around 1,600 participants. The vaccine is made from a weakened version of a common cold adenovirus taken from Chimpanzee and genetically modified to make it impossible for it to infect humans.

<https://starofmysore.com/jss-hospital-shortlisted-for-covid-vaccine-drug-trials/>

## The six strains of SARS-CoV-2

The virus causing the COVID-19 pandemic, SARS-CoV-2, presents at least six strains. Despite its mutations, the virus shows little variability, and this is good news for the researchers working on a viable vaccine.



Worldwide distribution of the SARS-CoV-2 six strains. Credit: *Frontiers in Microbiology*

These are the results of the most extensive study ever carried out on SARS-CoV-2 sequencing. Researchers at the University of Bologna drew from the analysis of 48,635 coronavirus genomes, which were isolated by researchers in labs all over the world. This study was published in the journal *Frontiers in Microbiology*. It was then possible for researchers to map the spread and the mutations of the virus during its journey to all continents.

The first results are encouraging. The coronavirus presents little variability, approximately seven mutations per sample. Common influenza has a variability rate that is more than double.

"The SARS-CoV-2 coronavirus is presumably already optimized to affect human beings, and this explains its low evolutionary change," explains Federico Giorgi, a researcher at Unibo and coordinator of the study. "This means that the treatments we are developing, including a vaccine, might be effective against all the virus strains."

Currently, there are six strains of coronavirus. The original one is the L strain, that appeared in Wuhan in December 2019. Its first mutation—the S strain—appeared at the beginning of 2020, while, since mid-January 2020, we have had strains V and G. To date strain G is the most widespread: it mutated into strains GR and GH at the end of February 2020.

"Strain G and its related strains GR and GH are by far the most widespread, representing 74% of all gene sequences we analyzed," says Giorgi. "They present four mutations, two of which are able to change the sequence of the RNA polymerase and Spike proteins of the virus. This characteristic probably facilitates the spread of the virus."

If we look at the coronavirus map, we can see that strains G and GR are the most frequent across Europe and Italy. According to the available data, GH strain seems close to non-existence in Italy, while it occurs more frequently in France and Germany. This seems to confirm the effectiveness of last months' containment methods.

In North America, the most widespread strain is GH, while in South America we find the GR strain more frequently. In Asia, where the Wuhan L strain initially appeared, the spread of strains G, GH and GR is increasing. These strains landed in Asia only at the beginning of March, more than a month after their spread in Europe.

Globally, strains G, GH and GR are constantly increasing. Strain S can be found in some restricted areas in the U.S. and Spain. The L and V strains are gradually disappearing.

Besides these six main coronavirus strains, researchers identified some infrequent mutations, that, at the moment, are not worrying but should nevertheless be monitored.

"Rare genomic mutations are less than 1% of all sequenced genomes," confirms Giorgi. "However, it is fundamental that we study and analyze them so that we can identify their function and monitor their spread. All countries should contribute to the cause by giving access to data about the virus genome sequences."

This study was published in the journal *Frontiers in Microbiology*, titled "Geographic and Genomic Distribution of SARS-CoV-2 Mutations."

**More information:** Daniele Mercatelli et al. Geographic and Genomic Distribution of SARS-CoV-2 Mutations, *Frontiers in Microbiology* (2020). DOI: [10.3389/fmicb.2020.01800](https://doi.org/10.3389/fmicb.2020.01800)  
<https://phys.org/news/2020-08-strains-sars-cov-.html>

**TIMESNOWNEWS.COM**

*Tue, 04 Aug 2020*

## **Russia plans mass production of COVID-19 vaccine from next month: Report**

*Russia is reportedly planning to begin mass production of a coronavirus vaccine from next month even as scientists and health researchers race against time to develop a safe jab against COVID-19*

Moscow: Russia is reportedly planning to begin mass production of a coronavirus vaccine from next month even as scientists and health researchers across the world race against time to develop a safe jab against COVID-19. Russia's Industry and Trade Minister Denis Manturov said that the country plans to make several million doses of coronavirus vaccines per month by the beginning of next year, Russian news agency *TASS* reported.

The minister said that the overall production of the vaccines will depend on the needs of the healthcare system. According to the report, Russian first domestic vaccine developed by the Gamaleya National Research Center of Epidemiology and Microbiology is expected to begin serial production in September.

"At the same time, according to preliminary estimates, due to the launch of contract platforms this year we will be able to ensure the production of several hundred thousand doses of vaccine per month with a subsequent increase to several million by the beginning of next year. We will do our best to make sure that these plans are implemented," Manturov was quoted as saying by *TASS* in an interview.

The report said as many as 26 COVID-19 vaccine options are being developed at 17 research institutions in Russia, according to the Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing.

The report added that the Vector research center of the Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing is developing a vaccine on six different technological platforms, adding that the first of them is expected to be launched in September, and the second one in October 2020.

On Saturday, local news, citing Russian Health Minister Mikhail Murashko, reported that the country is preparing a mass vaccination campaign against COVID-19 for October, adding the Gamaleya Institute had completed clinical trials of the vaccine and paperwork is being prepared to register it.

<https://www.timesnownews.com/health/article/russia-plans-mass-production-of-covid-19-vaccine-from-next-month-report/631262>

