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Business Standard

Fri, 03 Dec 2021

Adding economy to defence

Make in India for defence equipment is languishing in the absence of large orders that can make local production viable

By Ajai Shukla

A fortnight ago in Jhansi, as part of the “Rashtriya Raksha Smarpan Parv” to mark the 75th year of Indian independence, Prime Minister (PM) Narendra Modi handed over to the Indian Air Force (IAF) a Light Combat Helicopter (LCH), indigenously designed, developed and manufactured by Hindustan Aeronautics Ltd (HAL). There was more than a little irony in making a public relations spectacle of the LCH, given that a request to build 15 of these helicopters for the IAF and army has been languishing before the Union Cabinet for long, after the LCH was granted initial operational clearance in 2017. The Cabinet Committee on Security, the body that clears large defence acquisitions, has been objecting to the LCH on the grounds that its indigenous content is too low for it to qualify as a “Made in India” product. In fact, the LCH does qualify as such, both under the Defence Procurement Procedure of 2016 which mandates a minimum indigenous content of 40 per cent; and under the Defence Acquisition Policy of 2020, which requires the indigenous content to be above 50 per cent. More generally, it is baffling how the PM chose the LCH as an indigenous product to celebrate on Rashtriya Raksha Samarpan Parv, even while his cabinet holds up manufacturing clearance for 15 LCHs on the grounds that they are not Indian enough.



A central reason for why genuinely Indian-designed, developed and manufactured products fail to qualify for indigenous status is the tendency of the Ministry of Defence (MoD) to place such small orders (for example, 15 LCHs) that it remains uneconomical to manufacture many components in the country to carry out import-substitution. That is genuinely difficult for some components, systems or sub-systems that are not used in large numbers. For example, every helicopter has just one control cable. Over the lifetime of India’s light helicopter fleet, just 1,000 cables would be required. Building a factory to meet that requirement is feasible, but would make the helicopter more expensive than if the cable were bought from a global original equipment manufacturer that builds and supplies worldwide in scale. Bottom line: Indigenisation costs.

The cost becomes viable, however, when a piece of defence equipment dovetails into a segment of military doctrine. It can then be designed, developed, manufactured and introduced into service in large numbers. Matching a doctrine with requirement is critical and the LCH example again springs to mind. The combination of rugged, high-altitude terrain along India’s northern borders, along with the sharply reduced physiological capacity of oxygen-starved soldiers make them critically dependent on airborne fire support – especially of the kind that can be poured onto the enemy by highly mobile firing platforms, such as the LCH. Clearly there is a convincing doctrinal base for the large-scale employment of the LCH, both in offensive operations and to provide mobility in defence. A persuasive argument could be made for the integration of such fires into

battalion, and certainly brigade, fire plans. Translating this into actual numbers the LCH could be inducted into service in very large numbers, creating an economic argument for indigenising more and more components, sub-systems and systems. Instead of building just a few dozen LCHs, a manufacturing run of several hundred would genuinely lower costs.

Along with lowering the domestic cost, the case for the LCH could be made more convincing by boosting export orders through the combination of a low ticker price, and a maintenance and overhaul package fuelled by a performance-based logistics (PBL) package that provided assurances to customers. Already, the MoD is organising exporters into trade bodies that can lobby in prospective buyer countries; and has joined global non-proliferation regimes such as the Missile Technology Control Regime, the Wassenaar Arrangement and the Australia Group, while lobbying for entry into the Nuclear Suppliers Group. The foreign direct investment (FDI) cap has been raised to 74 per cent under the automatic route. The government could do more to provide prospective customers of defence kit with lines of credit that would incentivise purchase. And there is a growing understanding that the real money is not in exporting components for global supply chains of foreign aerospace and defence corporations, but in exporting high-value weapons platforms, such as fighter aircraft, helicopters, tanks, warships and artillery guns. Only then is the MoD likely to come anywhere near its ambition of tripling exports in the next five years, or meeting the 2018 Defence Production Policy's annual export target of \$5 billion by 2025.

Finally, if the defence production eco-system were to examine deeply the question of which areas of technology and equipment present the maximum opportunities for indigenisation, they would not take long to reach the answer: aero engines. Given that aero engines account for one-third the cost of a new military aircraft, it is assessed that India will buy foreign military aero engines worth Rs 350,000-400,000 crore over the next two decades. Yet, in the hoopla over indigenisation, successive governments have neglected the development and manufacture of aero engines.

Take the cost of engines for on-going helicopter programmes alone. HAL will build some 400 Dhruvs and about 180 LCHs, both twin-engine choppers. Another 400 single-engine light utility helicopters (LUH) will replace the Chetak and Cheetah fleet. With each of these helicopter engines requiring two replacements during their service lives, that amounts to some 5,000 Shakti engines. With the Shakti currently priced at about eight crore rupees, this adds up to Rs 40,000 crore. Add inflation, the cost of replacing failed components, and the consumption of gaskets and bearings; and the figure would exceed Rs 50,000 crore. This is the expenditure on helicopters alone; the spending on fixed wing aircraft would be several times higher.

The world's big engine vendors happily sell India aero engines; technology-protection is not an issue because reverse-engineering high-performance engines is very difficult. Key aero engine technologies relate to materials (high-temperature composites and alloys); and precision engineering, which are both difficult to copy. With even China having failed to reverse engineer a truly high-performance aero engine, the Defence R&D Organisation (DRDO) has made even less headway in developing the Kaveri engine for the Tejas fighter. As against the 82-90 kiloNewtons (kN) of peak thrust needed, the Kaveri has only managed 72 kN during flight testing in Russia.

The DRDO is still seeking a technological breakthrough, but with limited resources. The total budget for the Kaveri, including on engineering and test facilities, has been limited to Rs 2,839 crore (defence minister to parliament in December 2012). India cannot spend on an engine as Beijing can, but the DRDO has a model to replicate --- India's successful missile development problem. This involved clearly identifying an aim, allocating technological manpower and leadership, and spending about enough to keep the projects going: a budget of at least Rs 14,000-15,000 crore. A breakthrough in developing a genuinely high-performance aero engine would open many doors for the Indian military.

https://www.business-standard.com/article/opinion/adding-economy-to-defence-121120201488_1.html

Sweden's Saab Pitches Gripen Fighter Aircraft to India at "Half The Price Paid For Rafale"

Price war unleashed ahead of IAF's mega global competition, pitting 125 Mn Euro Gripen against 216 Mn Euro Rafale

By Vishal Thapar

Sweden's Saab group made a bold, pre-tender pitch for an Indian order for 114 fighter aircraft by declaring that its Gripen E single-engine fighter is on offer for "half the price India has paid for the Rafale". Saab expects India to launch a global tender in the "first half of next year".

The Rafale is a larger, twin-engined aircraft and therefore more expensive but Saab is pitching its single-engine aircraft as a dramatically cheaper solution for the same role.

To illustrate its claim on a massive price advantage, Saab disclosed its price bid for an ongoing tender for 64 fighter aircraft for Finland, also known as the HX Fighter programme.

In an online media briefing, Magnus Skogberg, Gripen Campaign Director for Finland revealed that the price offered for 64 Gripen E fighters is 6.5 Billion Euros, which includes the cost of a sustainment package for a decade as well as transfer of technology to Finland. The weapons package has been offered for an additional 1.5 Billion Euros.

This weapons package is similar in capability to the one India has acquired in the 7.8 Billion Euro deal for 36 Rafale fighters. It includes the Meteor, IRIS-T, KEPD-350 Taurus and the Spear.

The Finland tender also involves the procurement of two Airborne Early Warning and Control (AEW&C) aircraft along with 64 fighters. Saab has offered two GlobalEye platforms at an additional 1 Billion Euros.

Skogberg expects the Finnish competition to be concluded and the winner announced later this month.

India paid an estimated price of 216.7 Million Euros (Rs 1,820.9 Crore) apiece for the Rafale in the 2016 deal. Without the weapons package, the cost was approximately 194.4 Million Euros (Rs 1,633.5 Crore). The current Gripen price, as disclosed by Skogberg, is 125 Million Euros (Rs 1,050.4 Crore) with the weapons package and 101.6 Million Euros (Rs 853.7 Crore) for the bare aircraft. In comparison, the contracted price of the indigenous Light Combat Aircraft (LCA) Mk 1A is Rs 578.3 Crore for the bare aircraft.

In 2012, the French Rafale was declared the winner of India's elaborate competition to purchase 126 Medium Multi-Role Combat Aircraft (MMRCA). The Gripen was one of the contenders in that tender. At that time, it could not meet the technical requirements of the IAF. From a field of six competing fighters in what was billed as the 'Mother of all Competitions', only the Rafale and the Eurofighter were adjudged technically compliant by the IAF. Both the Rafale and the Eurofighter are twin-engined fighters.

The tender was aborted in 2015 reportedly over an impasse in contractual negotiations between Dassault of France and HAL for manufacturing 108 of the 126 fighters in India as per the terms of the tender. But India stuck by the IAF's 2012 choice of the Rafale in making a stand-alone, emergency purchase of 36 Rafale fighters in 2016 for 7.8 Billion Euros off the shelf to bolster its sharply depleting airpower.



The Gripen E hardsell: Starting its campaign early, Saab wants affordability to be the biggest talking point in India's mega fighter acquisition programme

The Rafale procurement and commitment to the LCA and the futuristic Advanced Medium Combat Aircraft (AMCA) notwithstanding, the IAF's requirement for six squadrons of a foreign jet persists. Given local limitations, acquiring six squadrons of a foreign jet through a manufacturing line in India is essential to the IAF's plans to take its fighter aircraft strength to a minimalistic 35 squadrons by 2035. Its actual requirement is pegged much higher at 42 squadrons.

The Multi-Role Fighter Aircraft (MRFA) programme to acquire 114 foreign jets through transfer of technology under the ambitious Strategic Partnership model has to be seen in this context. The MRFA is poised to be a re-run of the abortive MMRCA with some changes. This time around, Saab claims to have overcome the deficiencies because of which it was technically relegated a decade earlier.

Saab is now extrapolating the figures in Finland's HX Fighter Programme to India's emerging competition - where the stakes are much higher - to provide contemporary comparisons. "We expect the RFP to be out in the first half of next year," Mats Palmberg, Head of Gripen India Campaign, said.

Saab is aggressively pitching its economy trump card and seeks to make the MRFA competition about reliability at low cost. "The Gripen offer ensures twice the number of fighters airborne at half the cost," Skogberg boasted, claiming a winning combination of low price and high serviceability. In its bid for the HX Fighter Programme, Saab has assured a minimum availability or serviceability rate of 78 per cent. "Over 50 of the 64 (offered to Finland) will always be available (to fly)," Skogberg said, disclosing further details about its offer to Finland.

He extended his economy pitch to operating costs. "The annual operational cost of the 64 Gripens to Finland will be under 250 Million Euros," the Saab honcho said. The Saab offer requires the customer to commit an additional 2 Billion Euros for upgrading the fighter over its 40-year life cycle.

Palmberg, who seeks to pitch an offer to India at a price similar to that offered to Finland, rejects the view that the IAF's firm commitment to the indigenous LCA - which seemed tentative a few years ago - will kill the market for foreign single-engine fighters like the Gripen and the F-16/F-21. "There's room for more single-engine fighters," the India Campaign head said, expressing hope that costs of acquisition and flying would not only keep the single-engines in contention but also be the winning card this time.

"There are two parts to our offer: Security of supply and the offer to help develop future fighters for India," Palmberg said, responding to questions by this reporter. "We've offered help on a broad set of technologies," he said, without elaborating the contours of the offer to assist India, which currently has the LCA Mk-II and the fifth generation AMCA on the drawing board.

<http://www.businessworld.in/article/Sweden-s-Saab-Pitches-Gripen-Fighter-Aircraft-To-India-At-Half-The-Price-Paid-For-Rafale-/01-12-2021-413505/>

Chandigarh: Adequate supply of oxygen in city, says health secretary

Dharam Pal, UT Adviser, is regularly monitoring the preparedness and has directed officials to ensure proper coordination with the private hospitals as well.

Chandigarh: The emergence of Omicron (B.1.1.529), a new variant of concern of SARS-CoV-2, the possible threat of a third wave of Covid-19, has initiated several steps by the health department Chandigarh to remain prepared for handling a rise in Covid cases and a high positivity.

Dharam Pal, UT Adviser, is regularly monitoring the preparedness and has directed officials to ensure proper coordination with the private hospitals as well. As part of this preparedness, Yashpal Garg, Health Secretary, convened a review meeting today with private hospitals for oxygen supply and other related issues. The meeting was attended by Dr Suman Singh, DHS, and Dr Manjit Singh, Nodal Officer Oxygen. According to Garg, Eden Hospital has placed an order for installation of PSA Oxygen Plant with 50 LPM capacity which is expected to be made functional by the end of December 2021.



Healing Hospital has placed a supply order for PSA Oxygen plant with 150 LPM capacity, which will be functional by December 31, 2021. (Representational)

Healing Hospital has placed a supply order for PSA Oxygen plant with 150 LPM capacity, which will be functional by December 31, 2021. Mukat Hospital has placed a supply order for Pressure Swing Absorption (PSA) oxygen plant with 140 LPM capacity and will be functional by January 31, 2022. Further, it has provided two tanks of Liquid Medical Oxygen (LMO) with a capacity of 430 litres each. Shri Dhanwantry Hospital is at the stage of finalising the purchase of a 250 LPM PSA plant. Some oxygen concentrators have already been procured while a few more are in the process.

Landmark Hospital has decided to install a tank of LMO with a capacity of 999 litres. However, the hospital was advised to go for PSA oxygen plant without any further delay. Chaitanya Hospital has installed four tanks of Liquid Medical Oxygen with the capacity of 200 litres each and these tanks will be functional from December 3 onwards and the hospital has also procured some oxygen concentrators. Santokh Hospital is getting one tank of LMO with a capacity of 200 litres in the next few days.

“There is an adequate supply of oxygen in the city. The efforts of private hospitals have been found to be quite satisfactory and the status will now be reviewed after about one month. In case the situation demands, the next meeting with private hospitals may be held after about 15 days,” said Garg.

Upping the capacity of oxygen at PGI to ensure uninterrupted supply, a 1000 LPM capacity PSA medical oxygen plant at Nehru Hospital Extension was inaugurated in October this year. The DRDO developed plant and the system cater to 190 patients at a flow rate of five litre per minute, and the institute now has the option of generating medical oxygen onsite, in a cost-effective manner. Prof Jagat Ram, the then director of PGI had stated that oxygen is a critical and important medical gas for the treatment of Covid-19 patients and the availability of continuous, high-quality, medical grade oxygen at all times has to be ensured. “PSA oxygen generator plant is a source of oxygen that can produce medical-grade oxygen, at scale, 24 hours a day, seven days a week. The

two PSA oxygen plants at PGI would utilise PSA technique and molecular sieve (zeolite) technology to generate oxygen directly from atmospheric air,” Prof Ram had stated.

“After the second wave, we did more additions in Government hospitals to ensure a regular supply of oxygen. Apart from the earlier plants, one 800 LPM plant in GMSH 16 and one in GMCH 32 will be operational by the third week of December, as installation work is underway. Three Covid Care Centres are in standby mode, and in case of need, can be operational in two to three days,” added Garg. Dr VK Nagpal, Medical Superintendent, GMSH 16 said, “We are very comfortable with the oxygen status in the hospital and there is no shortage of oxygen, as our 500 LPM plant is already operational.”

<https://indianexpress.com/article/cities/chandigarh/adequate-supply-of-oxygen-in-city-says-health-secretary-7653441/>

THE TIMES OF INDIA

Fri, 03 Dec 2021

Makarand Hampiholi takes charge of Southern Naval Command

By Gururaj Jamkhndi

Dharwad: Dharwad lad Vice Admiral Makarand Arvind Hampiholi assumed charge as the Flag Officer Commanding-in-Chief, Southern Naval Command, on Wednesday.

Makarand was born in Dharwad and did his primary education at Saint Joseph's High School before joining Sainik School in Vijayapura. After passing out from Sainik School he joined National Defence Academy. He is the first alumnus of Sainik School Bijapur to have risen to the coveted appointment as the Commanding-in-Chief of Command Headquarters across all three services.

His father Arvind Hampiholi had served in Indian Army and later in the Commercial Tax department in Karnataka while mother Sangeeta Hampiholi, a renowned singer was an announcer in All India Radio, Dharwad.

Commissioned in the Executive Branch of the Indian Navy on July 1, 1985, the Flag officer is an anti-submarine warfare specialist and alumnus of the 64th course of National Defence Academy (President's gold medal), Defence Services Staff College (scudder medal), the erstwhile College of Naval warfare, Mumbai (Commander-in-Chief Silver Medal) and the prestigious National Defence College, New Delhi.

A recipient of Ati Vishist Seva Medal and Nao Sena Medal (Devotion to Duty) he has held various key operational, staff and training appointments including the command of INS Nashak (Missile Vessel), INS Magar {Landing Ship Tank (Large)} and INS Talwar (Frigate). During his Command of INS Nashak and INS Talwar, the ships were awarded the "Best Ship" trophies.

He was the commandant of the prestigious Indian Naval Academy, Ezhimala, prior assuming the command of the Southern Naval Command.

Speaking to TOI from Kochi, Makarand said it was the sound foundation he got at Sainik School and blessings and support of parents and elders which helped him reach where he is now. "I believe in Bhagawadgitha's verse 'Karmanye Vaadhikaraste Maa Phaleshu Kadachana'. Discharging my duties without expecting reward. God has been kind to me," Makarand said.

<https://timesofindia.indiatimes.com/city/hubballi/makarand-hampiholi-takes-charge-of-southern-naval-command/articleshow/88057847.cms>

Bharat Dynamics sign Rs 471.41-crore contract with Indian Army

The contract for the refurbishment of IGLA-1M missiles will run for 10 years, the defence PSU has said

Bharat Dynamics Limited (BDL) on December 2 said it had signed a Rs 471.41-crore contract with the Indian Army for the refurbishment of IGLA-1M missiles.

The contract will run for 10 years, the defence PSU said in a regulatory filing.

Apart from the refurbishment, BDL deals with manufacture and supply of guided missiles and associated equipment, underwater weapon systems, airborne weapon systems, ground support equipment and product life cycle support.

Previously, the firm had exported torpedoes to a “friendly foreign country” and received leads from several countries for its products. BDL said to export its ‘Made in India’ products to friendly foreign nations, it had taken up several steps to be a part of the global supply chain by entering into memoranda of understanding and agreements with foreign original equipment manufacturers.



Representative image (Image: Reuters)

BDL is also planning to set up a new unit at Jhansi in the UP Defence Corridor, which will be its sixth manufacturing unit and first in northern India.

At this unit, the company will make a propulsion system that will be used in all anti-tank guided missiles and futuristic missiles manufactured by the firm.

The stock closed 3 percent higher on the National Stock Exchange at Rs 426.80 following the deal announcement.

<https://www.moneycontrol.com/news/business/bharat-dynamics-sign-rs-471-41-crore-contract-with-indian-army-7785301.html>

Indian Army to get new uniform with digital print, here's why

The new uniform will be of digital pattern like the troopers of the US Army use. "The camouflage of the changed uniform is better than its previous one," said a senior Indian Army official

By Surabhi Pathak

Highlights

- 1. The soldiers will not have to tuck-in the dress. In the new uniform, the belt will be under the dress*
- 2. The new uniform has been designed keeping the comfort levels in mind*

New Delhi: The Indian Army will have a new combat uniform for its personnel aimed to provide more comfort and sustainability, sources said. The new combat dress would be unveiled during the Army Day Parade on January 15 next year.

For the first time in its history, the Army Day parade will witness uniform and weapons of a different era, dating back to even pre-Independence times. The troops will also march sporting the new uniform during the Republic Day parade next year.



The new uniform will be of digital pattern like the troopers of the US Army use. "The camouflage of the changed uniform is better than its previous one," said a senior Indian Army official.

The Army has always objected to other paramilitary forces wearing combat dresses of similar pattern. "Many a times we had flagged it," said the official.

Interestingly, the soldiers will not have to tuck-in the dress. In the new uniform, the belt will be under the dress.

The official said that it has been designed keeping the comfort levels in mind.

So far the Army contingents at the Army Day parade and the Republic Day parade have marched sporting dresses as per the different regiments.

<https://zeenews.india.com/india/indian-army-to-get-new-uniform-with-digital-print-heres-why-2415630.html>

भारतीय सैनिकों की बदलती वर्दी के बीच जानिए क्या पहनते हैं चीनी सौल्जर

भारतीय सेना को नई वर्दी मिलने जा रही है, जो ज्यादा हल्की और अलग अलग मौसमों के हिसाब से ज्यादा अनुकूल होगी। इसे डिजिटल पैटर्न पर तैयार किया गया है। जिससे छिपने में भी मदद मिलेगी। लेकिन सेना को अपने सैनिकों को आधुनिक उपकरणों से लैस करने की दिशा में बहुत कुछ करना है।

जानते हैं कि चीनी सैनिकों की यूनिफॉर्म कैसी है और कैसी है उनकी युद्धक पोशाक

नए साल में 13 लाख भारतीय सैनिकों को डिजिटल पैटर्न से तैयार नई यूनिफॉर्म मिलेगी, जो ज्यादा हल्की, बेहतर और मौसमों से मुकाबला करने में सक्षम होगी। भारतीय सेना आधुनिकीकरण की ओर बढ़ रही है। उसका इरादा अगले कुछ सालों में भारतीय सैनिकों की युद्धक पोशाक और पहने जाने वाले उपकरणों को कहीं ज्यादा आधुनिक कर देने की है। हालांकि हम अभी इस काम में चीन से पीछे हैं, जिसने अपने सैनिकों की युद्धक पोशाक और पहने जाने वाले उपकरणों की दिशा में काफी ध्यान दिया है।



चीनी सैनिकों की यूनिफॉर्म और साजोसामान (शटरस्टॉक)

वैसे भारत में एक प्रोजेक्ट इस दिशा में काम कर रहा है, जो भारतीय सैनिकों की काम्बेट यूनिफॉर्म और इसके साथ इस्तेमाल किए जाने वाले उपकरणों में काफी बेहतर स्थिति ले आएगा। फिलहाल भारतीय सैनिक यूनिफॉर्म के साथ बुलेटप्रूफ जैकेट, हैवी लेदर शूज और स्टैंडर्ड हेडगीयर पहनते हैं। उनके साथ अब तक इंसान रायफल रहती थी लेकिन अब ये बदली जा रही है। इसकी जगह एसआईजी सौर राइफल्स ले रही हैं।

ये तो जाहिर है कि भारत को अब असली खतरा किसी और देश से नहीं बल्कि चीन से है। जिसकी सेनाएं ना केवल सीमा पर डटी हुई हैं बल्कि पिछले एक साल में उसने सीमा के दूसरी ओर अपनी तैयारियों को लगातार बेहतर किया है। चीन ने सेना का आधुनिकीकरण तो कर ही लिया है साथ ही अपने सैनिकों के रोजाना साजोसामान पर भी काफी काम किया है। हालांकि सैनिकों के व्यक्तिगत साजोसामान की दृष्टि से अमेरिका नंबर एक की स्थिति पर है।



एक चीनी सैनिक का व्यक्तिगत साजोसामान और उसकी कीमत

आपको मालूम है कि एक चीनी सैनिक ऊपर सिर से लेकर नीचे पैरों तक यानि हेलमेट से लेकर बूट तक कितने कीमत के साजोसामान पहनते हैं। उसमें उसकी वर्दी भी है, हाथ में ली हुई रायफल भी और महंगा हेलमेट भी। लेकिन अमेरिकी सेना की तुलना में इसे बहुत हल्की क्वालिटी और कम कीमत का माना जाता है। क्या आप अंदाज लगा सकते हैं कि इनकी कीमत कितनी होगी।

कितनी बेहतर क्वालिटी के होते हैं चीनी सैनिकों के साजोसामान

चीन के प्रमुख समाचार पत्र पीपुल्स डेली ने कुछ समय पहले ये जानकारी दी थी। ये सारे साजोसामान खुद चीन में विकसित किए गए हैं। हालांकि दुनिया में ये सवाल अब भी उठता है कि चीन जितना पैसा अपनी आर्मी पर खर्च करता है, वो अपने सैनिकों पर नहीं करता। बल्कि उसके सैनिकों के साजोसामान और उपकरण उतनी बेहतरीन क्वालिटी के नहीं होते, जितने होने चाहिए। हालांकि ये बात सही है कि इस समय सैनिकों के व्यक्तिगत साजोसामान के मामले में चीन को दुनिया की बेहतरीन तीन आर्मी में रखा जाता है।

जब एक चीनी सैनिक तैयार होता है, तो उसे ये साजोसामान अनिवार्य तौर पर पहनना और साथ रखना होता है। इसमें एक खास हेलमेट होता है तो बैकपैक और फर्स्ट एंड किट भी।

हर चीनी सैनिक लैस होता है 11 सामानों के साथ

हर चीनी सैनिक को वर्दी समेत 11 व्यक्तिगत साजोसामान के साथ तैयार होना होता है। अगर भारतीय मुद्रा के हिसाब से देखें तो एक चीनी सैनिक के पास आटोमैटिक राइफल, वर्दी और जो अन्य साजोसामान, उपकरण होते हैं, उनकी कुल कीमत 81,549 रुपए होती है। यहां ये भी बताना जरूरी है कि 01 चाइनीज युआन 10.66 रुपए के बराबर होता है।

चीन अपनी सेना पर पर्याप्त पैसा खर्च करता है

अब हम आपको बताते हैं कि सिर से लेकर पैर एक चीनी थल सैनिक के लिए क्या पहनना जरूरी होता है और वो क्या आवश्यक उपकरण होते हैं, जिसको उसको साथ रखना ही होता है और इनमें से हरेक की कीमत भारतीय मुद्रा के अनुसार क्या होती है। वैसे यहां आपको ये भी बता दें कि वेस्टर्न रिसर्च इंस्टीट्यूट ने एक रिसर्च के बाद कहा कि वर्ष 2008 के बाद चीन दुनिया का दूसरा देश हो गया है, जो अपनी सेना पर सबसे ज्यादा पैसा खर्च करता है। हालांकि अमेरिकी मीडिया बरसों से इस दावे की हंसी उड़ाता रहा है।

अमेरिका कहीं ज्यादा खर्च करता है

माना जाता है कि अमेरिका अपनी सेना पर चीन से पांच गुना ज्यादा खर्च करता है। वहीं अमेरिका अपने एक सैनिक के व्यक्तिगत साजोसामान पर चीन से 10 गुना ज्यादा खर्च करता है। हालांकि ये कहा जाता है कि एक चीनी सैनिक का व्यक्तिगत साजोसामान एक अच्छे आईफोन कीमत के बराबर होता है तो अमेरिका सैनिक के व्यक्तिगत साजोसामान की कीमत मध्यम दर्जे की कार के बराबर, जिसमें 20 अच्छे आईफोन आ जाएं।

चीनी सैनिकों के व्यक्तिगत साजोसामान

खैर चलिए अब हम आपको बताते हैं कि चीन सैनिक ऊपर से लेकर नीचे तक कौन सा साजोसामान पहनते हैं और कितने के होते हैं

हेलमेट - ये खास हेलमेट 16795 रुपए का होता है। इसे QGF02 helmet कहा जाता है, जिसे चीन ने 1994 में विकसित किया। इसमें केवलर मटीरियल का इस्तेमाल होता है। ये हल्का होता है लेकिन इस पर बम असर नहीं करता। चीनी सेना का दावा है कि ये हेलमेट अमेरिकी सेना के PASGT हेलमेट से कहीं बेहतर होते हैं। हालांकि अमेरिकी मीडिया इस दावे को गलत ठहराती है। बकौल उसके चीनी सैनिकों के हेलमेट अब भी बहुत हल्के दर्जे के होते हैं। इनकी तुलना अमेरिका के इलैक्ट्रॉनिक सिस्टम युक्त हेलमेट से नहीं किया जा सकता।

कैमोफ्लॉज टैक्टिकल वेस्ट - ये 2976 रुपए का होता है। हालांकि ये हैरानी की बात है कि चीन अपने सैनिकों बॉडी आर्मर क्यों नहीं पहनाता, जो सबसे ज्यादा जरूरी होते हैं। अमेरिकी मीडिया ने सवाल उठा चुका है कि यूं तो चीन दुनियाभर में सबसे सस्ते बॉडी आर्मर बेचता है लेकिन उसके विशेषज्ञ अपने सैनिकों को बॉडी आर्मर पहनाने पर मुंह बिचकाते हैं, जबकि वो सैनिकों के लिए बहुत जरूरी होते हैं।

सबसे ज्यादा कीमत की होती है ए95 राइफल

इसके अलावा अन्य साजोसामान में रेनकोट (1700), केटली (1754), फर्स्ट एड किट (532), वुडलैंड कैमोफ्लॉज कपड़े की दमदार वर्दी (1667), बैकपैक (1967), बोवेन बेल्ट (1010) और काम्बैट बूट (3401) शामिल होता है। इसमें सबसे ज्यादा कीमत का उपकरण उनके साथ ए95 राइफल होती है जिसकी कीमत 45,707 रुपए होती है, ये लंबी दूरी तक मार कर सकती है। इसे आपरेशंस के दौरान काफी विश्वसनीय माना जाता है।

बुलेटप्रूफ अंडरवियर नहीं पहनते

अफगानिस्तान में जब अमेरिकी सैनिक गए तो उनकी आम शिकायत होती थी कि ऊपरी बॉडी यानि सिर और छाती की सुरक्षा के लिए हेलमेल और आर्मर होता है लेकिन लोअर बॉडी यानि शरीर के निचले हिस्से की सुरक्षा के लिए कुछ नहीं होता। तब पेंटागन ने सैनिकों को बुलेटप्रूफ अंडरवियर मुहैया कराए। अमेरिकी मीडिया हंसी उड़ाते हुए कहता है कि चीन में तो सैनिक अब भी एलास्टिक वाला अंडरवियर पहनते हैं, जबकि जमाना कहीं आगे बढ़ चुका है।

<https://hindi.news18.com/news/knowledge/indian-army-gets-new-digital-pattern-uniform-know-about-chinese-soldier-combat-uniform-3877873.html>

GRSE looking to win orders from India's neighbours, S-E Asia, Africa

By Elizabeth Roche

- *To boost its prospects in commercial ship building, GRSE has signed preliminary pacts with DCNS of France and Gibbs and Cox of the US for collaboration in design of ships to boost exports*

New Delhi: Competition from China notwithstanding, Indian warship maker Garden Reach Shipbuilders and Engineers Ltd (GRSE) is making a determined bid to win orders from countries in India's periphery, Southeast Asia, and Africa to build up its order book.

According to Rear Admiral V.K.Saxena, chairman and managing director of Kolkata-based GRSE, a defence sector public sector unit (PSU), which currently sees 7% of its total turnover from exports, aims to increase that to 25%-30% in the next five years. The company has bagged commercial orders from Guyana and Bangladesh for construction of an ocean-going passenger-cum-cargo vessel from the former, and patrol boats for the fishery department from the latter.

Speaking to reporters on Thursday, Saxena said plans to modernise the ship builder incorporating Artificial Intelligence, 3D modeling and virtual reality labs were sped up thanks to the covid-19 pandemic that put a strain on manpower as well as supply chains.

The defence PSU recently took delivery of a completely assembled crane, weighing more than 1,600 tonne, transported to Kolkata from South Korea. The new crane would help speed up production of the 23 platforms that are part of the GRSE's current order book which consists of six projects. Three of the six projects have been commissioned by the Indian Navy, which include the construction of stealth frigates, survey vessels, and anti submarine warfare shallow water crafts.

GRSE had also signed a concessionary agreement with Kolkata Port Trust (KPT) to formally takeover the three docks from KPT that will be utilised for refits and repairs of not only military boats but commercial vessels as well, Saxena said. He noted that there were good prospects for business not only from India but also Bangladesh.

On GRSE bagging export orders from Guyana and Bangladesh, Saxena described this as a "small beginning" adding that the possibilities were bright.

"Earlier, we were never looking at that (exports) but thanks to the Government of India initiatives and the targets they have set in for exports of defence platforms, but I am even looking at commercial platforms. So I am pretty sure that these are the openings and we being a competent shipyard that has produced 788 platforms including 107 warships, we have got everything," Saxena told reporters at a virtual briefing. "And possibly we can make inroads into the exports arena as well," he said.

The reference was to Prime Minister Narendra Modi last year setting Indian defence manufacturers the target of \$5 billion in exports by 2025. The defence ministry has made out a list of more than 200 defence hardware products that are to be procured from domestic companies in a bid to boost defence manufacturing in India which has the reputation of being one of the three top military hardware buyers in the world.

<https://www.livemint.com/politics/news/defence-psu-garden-reach-shipbuilders-eyes-exports-to-se-asia-african-countries-11638444263378.html>

India will have nine nuclear reactors by 2024, govt tells Parliament

Asked whether the government is thinking of phasing out nuclear power plants on account of safety, the minister said, "We have not only increased the number but are also trying to make a pan-India generation project."

The nation will have nine nuclear reactors by 2024 and a new nuclear project, the first in northern India, will come up 150 kms away from Delhi in Gorakhpur of Haryana, the government informed the Rajya Sabha.

Minister of State for Personnel, Public Grievances and Pensions Jitendra Singh said, "By 2024 you will have nine nuclear reactors plus 12 new additional ones which were approved during the Covid times with a capacity of 9000 MW. Five new sites are also being identified," in different parts of the country.



Replying to supplementaries during the Question Hour, he said what is remarkable is that unlike in the past when nuclear plants were limited to a few states like Andhra Pradesh and Tamil Nadu, the department has now moved northwards.

"We are going to have a nuclear project, the first of its kind, in North India just about 150 kms from here in a small township called Gorakhpur in Haryana," said Singh, also Minister of State in Prime Minister's Office.

Asked whether the government is thinking of phasing out nuclear power plants on account of safety, the minister said, "We have not only increased the number but are also trying to make a pan-India generation project."

The minister said that nuclear energy will soon emerge as one of the most important sources of alternative or clean energy for the increasing power demand of the country.

As far as the cost is concerned, though it varies from plant to plant and on the age of the plant, Singh said on an average it comes to about Rs 3 per unit and while the Kudankulam plant has about Rs 4 per unit and Tarapur has lesser cost.

But in the times to come, with more plants the cost would reduce, he said.

Singh said it was during the tenure of this government that a bulk approval of 10 indigenous reactors was done in a single cabinet decision, which is a record in itself and has never happened in the history of independent India.

In order to promote the setting up of new projects and to overcome the financial constraints that are faced in such situations, the prime minister took an out-of-box decision of allowing the atomic energy department to enter into joint ventures, which was never happening before, and the insurance pool has also been increased, Singh told the upper house.

On the expansion of Kudankulam nuclear plant, the Minister also said that "hopefully in 2021, we plan to start the construction of unit 5 and unit 6 as well."

Within the two terms of the present government, he said the Kudankulam plant will have as many as six units whereas in the earlier UPA government hardly the first unit was in progress. Singh said in 2017-18 there was a generation of 38,336 mega units of power, while this year ending 2020 despite the Covid pandemic it has been 46,472 mega units. During Covid itself we have increased the power generation by more than 4000 mega units in nuclear plans, he said.

The minister said in spite of the Covid pandemic, because of the extra impetus given by the prime minister to the enhancement of atomic energy generation and setting up of new units of the reactor, the Kudankulam plant has been progressively showing new constructions and generation.

On whether the atomic energy sector has suffered cuts in the budget due to Covid, the minister said in 2019, the Prime Minister took a decision to give us a Rs 10,000 crore per year budget and this year also we had a budget of Rs 17,796 crore. For next 10 years also, there is a plan to increase the budget by Rs 10,000 crore per year, he said.

The minister also informed that earlier, most of our nuclear projects were with the support of Russia and France and now more and more of our reactors are becoming indigenous.

"The Budget proposed by DAE for Capital expenditure during 2021-22 was Rs 17,796.24 crore and approved BE 2021-22 for Capital Expenditure is Rs11,403.20 Crore. There is a shortfall of Rs 6393.04 crore.

"However, it is brought out that due to COVID-19 Pandemic, the situation had not completely normalised at Project sites till the first half of 2021-22. Therefore, no major adverse impact is anticipated on the progress of various ongoing projects, the minister said in his written reply.

<https://www.businesstoday.in/latest/economy/story/india-will-have-nine-nuclear-reactors-by-2024-govt-tells-parliament-314264-2021-12-02>

THE TIMES OF INDIA

Fri, 03 Dec 2021

‘In national interest’: India defends S-400 buy as curbs loom

New Delhi: As the threat of US sanctions looms over India’s purchase of S-400 system from Russia, India on Thursday reiterated that it follows an independent foreign policy and its defence acquisitions will continue to be guided by “national security interests”.

The remark by MEA spokesperson Arindam Bagchi was in response to a question on whether or not the US was likely to impose the dreaded CAATSA sanctions on India for acquiring the missile defence system. He reiterated that India and the US have a comprehensive strategic partnership and India has a special and privileged strategic partnership with Russia. His remarks came ahead of President Vladimir Putin’s visit next week for the annual summit.



The government said the 21st India-Russia summit in Delhi on December 6 will offer an opportunity to the two leaders to exchange views on regional, multilateral and international issues of mutual interests.

Giving details of the engagements between the two sides on December 6, Bagchi said defence minister Rajnath Singh will hold a meeting with his Russian counterpart Sergey Shoygu India-Russia under the framework of the India-Russia Inter-Governmental Commission on Military-Technical Cooperation.

Separately, external affairs minister S Jaishankar will hold talks with his Russian counterpart Sergey Lavrov.

Following the two meetings, the foreign and defence ministers of the two countries will hold the inaugural ‘2+2’ ministerial dialogue that is expected to discuss bilateral, regional and international issues.

<https://timesofindia.indiatimes.com/india/in-national-interest-india-defends-s-400-buy-as-curbs-loom/articleshow/88059959.cms>



Fri, 03 Dec 2021

Scientists use quantum processor to simulate 2D states of quantum matter

What would it be like if we lived in a flat two-dimensional world? Physicists predict that quantum mechanics would be even stranger in that case, resulting in exotic particles—so-called "anyons"—that cannot exist in the three-dimensional world we live in. This unfamiliar world is not just a curiosity but may be key to unlocking quantum materials and technologies of the future.

In collaboration with the Google Quantum AI team, scientists from the Technical University of Munich and the University of Nottingham used a highly controllable quantum processor to simulate such states of quantum matter. Their results appear in the current issue of the renowned scientific journal *Science*.

Emergent quantum particles in two-dimensional systems

All particles in our universe come in two flavors, bosons or fermions. In the three-dimensional world we live in, this observation stands firm. However, it was theoretically predicted almost 50 years ago that other types of particles, dubbed anyons, could exist when matter is confined to two dimensions.

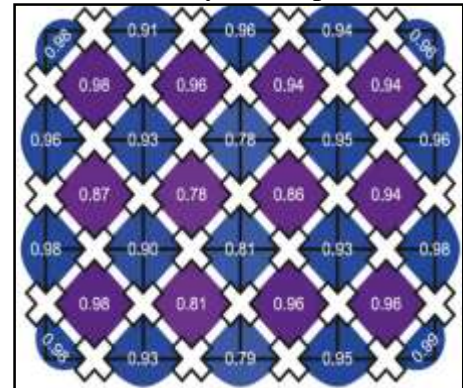
While these anyons do not appear as elementary particles in our universe, it turns out that anyonic particles can emerge as collective excitations in so-called topological phases of matter, for which the Nobel prize was awarded in 2016.

"Twisting pairs of these anyons by moving them around one another in the simulation unveils their exotic properties—physicists call it braiding statistics," says Dr. Adam Smith from the University of Nottingham.

A simple picture for these collective excitations is "the wave" in a stadium crowd—it has a well-defined position, but it cannot exist without the thousands of people that make up the crowd. However, realizing and simulating such topologically ordered states experimentally has proven to be extremely challenging.

Quantum processors as a platform for controlled quantum simulations

In landmark experiments, the teams from TUM, Google Quantum AI, and the University of Nottingham programmed Google's quantum processor to simulate these two-dimensional states of quantum matter. "Google's quantum processor, named Sycamore, can be precisely controlled and is a well-isolated quantum system, which are key requirements for performing quantum computations," says Kevin Satzinger, a scientist from the Google team.



In collaboration with the Google Quantum AI team scientists from the Technical University of Munich (TUM) and the University of Nottingham used a quantum processor to simulate the ground state of a so-called toric code Hamiltonian – an archetypical model system in modern condensed matter physics, which was originally proposed in the context of quantum error correction. The image shows the experimentally measured parity values for a 31-qubit lattice in the toric code ground state. The qubits ("×") are placed on the links of a square lattice. The parity expectation values of the star- and plaquettes operators are shown as blue and purple tiles, respectively. The average fidelity of 0.92 ± 0.06 shows that the ground state has been prepared with high accuracy. Credit: Google Quantum AI

The researchers came up with a quantum algorithm to realize a state with topological order, which was confirmed by simulating the creation of anyon excitations and twisting them around one another. Fingerprints from long-range quantum entanglement could be confirmed in their study. As a possible application, such topologically ordered states can be used to improve quantum computers by realizing new ways of error correction. First steps toward this goal have already been achieved in their work.

"Near-term quantum processors will represent an ideal platform to explore the physics of exotic quantum phases matter," says Prof. Frank Pollmann from TUM. "In the near future, quantum processors promise to solve problems that are beyond the reach of current classical supercomputers."

More information: K. J. Satzinger et al, Realizing topologically ordered states on a quantum processor, *Science* (2021). [DOI: 10.1126/science.abi8378](https://doi.org/10.1126/science.abi8378)

Journal information: *Science*

<https://phys.org/news/2021-12-scientists-quantum-processor-simulate-2d.html>



Fri, 03 Dec 2021

Molecular device turns infrared into visible light

Light is an electromagnetic wave: It consists of oscillating electric and magnetic fields propagating through space. Every wave is characterized by its frequency, which refers to the number of oscillations per second, measured in Hertz (Hz). Our eyes can detect frequencies between 400 and 750 trillion Hz (or terahertz, THz), which define the visible spectrum. Light sensors in cell phone cameras can detect frequencies down to 300 THz, while detectors used for internet connections through optical fibers are sensitive to around 200 THz.

At lower frequencies, the energy transported by light isn't enough to trigger photoreceptors in our eyes and in many other sensors, which is a problem given that there is rich information available at frequencies below 100 THz, the mid- and far-infrared spectrum. For example, a body with surface temperature of 20°C emits infrared light up to 10 THz, which can be "seen" with thermal imaging. Also, chemical and biological substances feature distinct absorption bands in the mid-infrared, meaning that we can identify them remotely and non-destructively by infrared spectroscopy, which has myriads of applications.

Turning infrared into visible light

Scientists at EPFL, Wuhan Institute of Technology, the Valencia Polytechnic University, and AMOLF in the Netherlands, have now developed a new way to detect infrared light by changing its frequency to that of visible light. The device can extend the "sight" of commonly available and highly sensitive detectors for visible light far into the infrared. The breakthrough is published in *Science*.



Artistic view of the nanoparticle-in-groove plasmonic cavities. Molecules cover the gold film and are sandwiched between the groove and the 150-nm large nanoparticle. The infrared signal of interest comes from below the substrate while the pump laser providing energy for upconversion comes from the top. Both are focused by the cavity onto the molecules, and interact with their internal vibrations to generate an upconverted copy of the infrared signal at visible frequencies (bright spot). Credit: Nicolas Antille

Frequency conversion is not an easy task. The frequency of light is a fundamental that cannot easily change by reflecting light on a surface or passing it through a material because of the law of energy conservation.

The researchers worked around this by adding energy to infrared light with a mediator: Tiny vibrating molecules. The infrared light is directed to the molecules where it is converted into vibrational energy. Simultaneously, a laser beam of higher frequency impinges on the same molecules to provide the extra energy and convert the vibration into visible light. To boost the conversion process, the molecules are sandwiched between metallic nanostructures that act as optical antennas by concentrating the infrared light and laser energy at the molecules.

A new light

"The new device has a number of appealing features," says Professor Christophe Galland at EPFL's School of Basic Sciences, who led the study. "First, the conversion process is coherent, meaning that all information present in the original infrared light is faithfully mapped onto the newly created visible light. It allows high-resolution infrared spectroscopy to be performed with standard detectors like those found in cell-phone cameras. Second, each device is about a few micrometers in length and width, which means it can be incorporated into large pixel arrays. Finally, the method is highly versatile and can be adapted to different frequencies by simply choosing molecules with different vibrational modes."

"So far, however, the device's light-conversion efficiency is still very low," cautions Dr. Wen Chen, first author of the work. "We are now focusing our efforts in further improving it." This is a key step toward commercial applications.

More information: Wen Chen et al, Continuous-Wave Frequency Upconversion with a Molecular Optomechanical Nanocavity, *Science* (2021). DOI: [10.1126/science.abk3106](https://doi.org/10.1126/science.abk3106). www.science.org/doi/10.1126/science.abk3106

Journal information: [Science](https://www.science.org)

<https://phys.org/news/2021-12-molecular-device-infrared-visible.html>



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Three-dimensional imaging with optical frequency combs

Holography is a powerful technique of photography of a light field without a lens for 3D imaging and display. Now, scientists at the Max-Planck Institute of Quantum Optics are moving holography forward by implementing it with optical frequency combs. Thousands of holograms over all colors of the rainbow can be recorded. Via digital processing, each hologram provides a three-dimensional image of the scene in which the focusing distance can be chosen at will. Combining all these holograms renders the geometrical shape of the three-dimensional object with high precision and no ambiguity. At the same time, other diagnostics can be performed by the frequency combs: Here, the scientists show molecule-selective imaging of a cloud of ammonia vapor.

Frequency combs go 3D

Reporting in *Nature Photonics*, an international team of scientists in the group of Nathalie Picqué at the Max-Planck Institute of Quantum Optics (MPQ) in Garching, Germany, demonstrates a new imaging technique with optical frequency combs.

An optical frequency comb generator emits a regular train of short laser pulses. The spectrum consists of a large number of precisely equally spaced sharp spectral comb lines. Such frequency combs have made it possible to count the wiggles of a light wave with high precision. Theodor

Hänsch, head of the Laser Spectroscopy Division at the MPQ, has shared the 2005 Nobel Prize in physics for this invention. Later on, in the technique of "dual-comb spectroscopy" developed at MPQ in the group of Nathalie Picqué, all the spectral lines of a frequency comb were used to interrogate a sample simultaneously over a broad spectral range, and the comb lines of a second laser with slightly different spacing interfere on a fast photodetector for read-out.

The new imaging method of hyperspectral digital holography extends the same interference method to holographic imaging. "The setup appears deceptively simple. It only uses two comb generators of slightly different pulse repetition rates, a partly transmitting beam-splitting mirror, and a fast digital camera sensor without lens," explains post-doctoral researcher Edoardo Vicentini.

A 3D object is illuminated by one of the pulse trains, and the scattered light is directed by the beam-splitter onto the camera sensor. The second pulse train is directed onto the same sensor as a reference beam. The camera registers a spatial interference pattern that changes with time, since the two lasers emit their pulses with a varying time separation. A video recording of such an interference pattern is shown in a supplemental video available from *Nature Photonics*.

In traditional holography, a fine interference pattern is recorded on film, and illumination of this hologram with a laser beam recreates the original wavefronts from the object by optical diffraction. In digital holography, the original scene is reconstructed by a computer program mimicking this process. In one of the reported experiments, two coins at different distances are used as objects. During digital reconstruction the focusing distance can be changed so that either of the coins appears in focus while the other appears blurred, as illustrated in the video.

"I was thrilled when I got a Matlab program to work, that could produce our movie of reconstructed images rather quickly," says Theodor Hänsch. "However, with a faster camera of megapixel resolution, the amount of recorded data can become rather large so that data processing will become more challenging."

Nathalie Picqué, pioneer of dual-comb spectroscopy, says, "Dual-comb interferometers already produce breathtaking results in spectroscopy and in ranging. The unique combination of broad spectral bandwidth, long temporal coherence and multi-heterodyne read-out offers powerful new features to holography. Our technique is likely to conquer new frontiers in scan-free wavefront reconstruction and three-dimensional metrology. Further, it will be exciting to explore its potential for microscopy of biological samples."

More information: Edoardo Vicentini et al, Dual-comb hyperspectral digital holography, *Nature Photonics* (2021). DOI: [10.1038/s41566-021-00892-x](https://doi.org/10.1038/s41566-021-00892-x)

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<https://phys.org/news/2021-12-three-dimensional-imaging-optical-frequency.html>

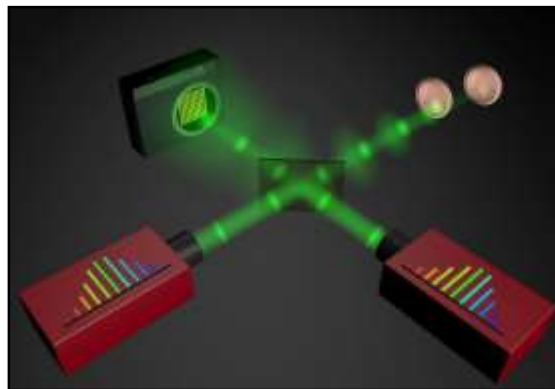


Fig. 1: Dual-comb digital holography. The regular train of pulses of a frequency-comb generator illuminates an object (here two coins in reflection). The wave scattered by the object spatially and temporally interferes with that of a reference comb at a lensless detector matrix. Credit: DOI: [10.1038/s41566-021-00892-x](https://doi.org/10.1038/s41566-021-00892-x)

Blood biomarker may predict mortality in COVID-19 patients

- *A new study identifies viral RNA as a blood biomarker that may help predict which patients with COVID-19 have the greatest risk of dying.*
- *The team found the biomarker in blood samples collected from people hospitalized with COVID-19 and later confirmed it in two other hospitalized patient groups.*
- *The scientists believe that their discovery could help medical professionals identify patients with the highest mortality risk.*

Since the COVID-19 pandemic began, in December 2019, medical professionals have struggled to identify which groups have the highest risk of mortality.

Early research unveiled some common factors, including median age and underlying chronic conditions. However, much remains unknown.

Now, a new study from the University of Montreal Hospital Research Centre (CRCHUM) has found that a blood biomarker of SARS-CoV-2, the virus that causes COVID-19, may help doctors determine which patients are most likely to die from the disease.

The researchers believe that this finding will allow medical professionals to provide treatments faster to patients with the highest risk of mortality.

The study appears in the journal *Science Advances*.

COVID-19 and the blood

Earlier research into COVID-19 and its connection to human blood has investigated why the disease causes blood clots, how blood thinners may protect against complications, and how five protein blood biomarkers may predict which patients become critically ill.

The lead author of the new study, Dr. Daniel Kaufmann, a principal scientist at CRCHUM and medical professor at Université de Montréal, spoke with *Medical News Today*. He explained that the purpose of this study was to identify a simple, reliable blood marker that could pinpoint patients with the highest risk of fatal illness.

“The course of COVID-19 is extremely variable among patients,” Dr. Kaufmann explained. “From a clinical care perspective, it is important to be able to rapidly identify the persons who are at the highest risk of evolving toward critical disease and death.”

“A lot of different blood measurements have been associated with severe disease,” he continued, “but it is really impractical to work with a profusion of parameters, and some will be more reliable than others.”

In this study, Dr. Kaufmann and his team found that one blood biomarker — viral RNA — helped predict which patients had the greatest risk of dying from COVID-19.

SARS-CoV-2 is an RNA virus, which means that RNA, rather than DNA, is its genetic material. Once inside a human cell, the virus co-opts our cellular machinery to build the proteins coded by its RNA. Some of this viral RNA (vRNA) is detectable in the blood of people with the infection.

Searching for the biomarker

For their study, Dr. Kaufmann and his team collected blood samples from 279 patients hospitalized with COVID-19. The disease severity ranged; some patients required no oxygen support, while others needed mechanical ventilation.

The researchers took blood samples from each person 11 days after their symptoms had appeared.

They also followed the participants for 60 days after their symptoms had appeared. Of the 279 patients, 13 died. Almost half of those died between 30 and 60 days after the first onset of symptoms. Most were in the “critical” patient group.

The researchers initially measured three main biomarkers in the blood of the participants: inflammatory proteins, vRNA, and the level of SARS-CoV-2 antibodies.

They found that the amount of vRNA in a patient’s blood provided the best predictor of mortality risk — noncritical patients had less vRNA than critical patients. Also, those who died had high levels of vRNA in their blood, compared with participants who survived.

Importantly, the researchers reported that the other biomarkers did not help predict mortality rates. To further examine their theory, the authors tested two additional COVID-19 patient groups — one from Montreal’s Jewish General Hospital and another from CRCHUM. Again, they found that their predictive model worked.

A new testing protocol?

Dr. Kaufmann noted that the measurements of immunological and virological parameters used in the study are not currently part of standard clinical testing. However, he said, measuring vRNA in the blood is routine for some other infections, such as HIV. Therefore, if more research data support a clinical application, doctors could rapidly implement this type of test.

“To determine if measurement of SARS-CoV-2 vRNA in plasma may have direct implications for clinical care, a critical research step is to determine how this indicator — and other parameters we measured in this study — varies with the new therapies that are now given to patients with severe COVID-19,” Dr. Kaufmann explained.

“The progress made has reduced the risk of fatal infection. A key question is: Can monitoring of blood vRNA be used to follow the impact of these new treatments in patients?”

MNT also spoke with Dr. Fady Youssef, a pulmonologist, internist, and critical care specialist at Long Beach Memorial Medical Center, in California. He said:

“A lot of times, I’ve had two patients next to each other, [of] similar age, similar ethnicity, similar symptoms, and one of them does OK and goes home, and the other one worsens and goes to the [intensive care unit] and sometimes passes away.”

“We don’t have any understanding of how can we tell which of those patients was going to worsen and which was going to improve. And so having a tool that lets us figure out that piece of the puzzle can help us with targeting therapies, especially when we’re having shortages with some of the therapies that we do use.”

In terms of next steps, Dr. Youssef said that he would like to see these findings applied in an outpatient setting, where the majority of COVID-19 care occurs.

“If we have better outpatient care and better ways to prevent patients from progressing, then that would minimize the demand on the inpatient setting,” he explained.

“If I had my wishes, I would say if somebody gets a diagnosis of COVID-19, they would get some lab work that would tell them what’s their risk of progressing to severe COVID-19. And then having some protocols that are done in the outpatient [setting], where the patients would receive treatments early on and help prevent the progression.”

According to Dr. Kaufmann, the next steps for his team involve examining how new therapies used to target excessive inflammation in COVID-19 might also affect the immune responses against the virus.

“In a new study,” he told *MNT*, “we are therefore currently investigating how these treatments given to patients with severe COVID-19 change these measurements, and if they keep their predictive capacity, with regard to disease outcome.”

<https://www.medicalnewstoday.com/articles/blood-biomarker-may-predict-mortality-in-covid-19-patients>

