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# 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

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*Tue, 04 May 2021*

## **RAFAEL's Air-to-Air Missile tried successfully by India**

India's Defense Research and Development Organisation (DRDO) has successfully trialed the 5th generation Python-5 air-to-air missile (AAM) for the Tejas, India's indigenous light combat aircraft. Python-5 is manufactured by Rafael Advanced Defense Systems.

The trials aimed to test the Python-5's air-to-air weapons capability and the capability of the already integrated Derby Beyond Visual Range (BVR) AAM.

The Python-5 provides a combination of lock-on after launch and acquisition and tracking capabilities. The missile is fitted with an 11kg warhead, an IR guidance system and EO imaging.

Derby achieved direct hits on a high-speed maneuvering aerial target. Python-5 also achieved 100% hits, meeting all the planned objectives of the trials.

Python-5 missile live firing was conducted to validate target engagement from all aspects as well as beyond visual ranges, in all live firings the missile hit the aerial target.

The missiles were all fired from Tejas aircraft of the Aeronautical Development Agency flown by Indian Air Force test pilots.

According to Shephard Defense Insight (cited by shephardmedia.com), the Tejas LCA features an AESA radar, a unified EW suite, an onboard oxygen generation system, smart MFDs and a HUD.

<https://i-hls.com/archives/108389>





Tue, 04 May 2021

## हिसार में डीआरडीओ के 500 बेड के अस्थाई कोविड अस्पताल को 10 मई तक शुरू करने का लक्ष्य

हिसार में 500 बेड का अस्पताल जिंदल मार्डन स्कूल में बनाया जा रहा है। जिसको डीआरडीओ द्वारा संचालित किया जाएगा। हिसार में कोरोना संक्रमितों की संख्या एक हजार को भी पार कर गई है। ऐसे में डीआरडीओ का अस्पताल बहुत जरूरी हो गया है।

By Manoj Kumar

हिसार: हिसार में बनाए जा रहे डीआरडीओ के 500 बेड के अस्थाई अस्पताल के लिए युद्ध स्तर पर काम जारी है। यहां शुरुआत से लेकर अंत तक पूरा उपचार एक ही जगह पर आपको मिल सकेगा। यहां पर टेस्टिंग की सुविधा भी उपलब्ध रहेगी। जैसे ही किसी कोरोना के लक्षण वाले लोगों को लाया जाता है वहीं पर ही आरटीपीसीआर टेस्ट हो जाएगा। इसके बाद कुछ देर में रिपोर्ट और उपचार शुरू कर दिया जाएगा।

इसके साथ ही दवाएं भी मरीजों को वहीं उपलब्ध रहेंगी। प्रशासन इन तैयारियों को लेकर उच्चाधिकारियों से संपर्क किया जा रहा है। गौरतलब है कि हिसार में 500 बेड का अस्पताल जिंदल मार्डन स्कूल में बनाया जा रहा है। जिसको डीआरडीओ द्वारा संचालित किया जाएगा। मगर अस्पताल की पूरी स्थापना राज्य सरकार स्थानीय प्रशासन की मदद से कर रही है।

अस्पताल के लिए 24 घंटे काम, 5 अधिकारी 300 श्रमिक कर रहे काम

हिसार में कोरोना संक्रमितों की संख्या एक हजार को भी पार कर गई है। ऐसे में डीआरडीओ का अस्पताल बहुत जरूरी हो गया है। इसको लेकर 24 घंटे काम लगातार जारी है। 5 अधिकारियों को इसकी मॉनीटरिंग की जिम्मेदारी दी गई है। वहीं दिन रात के हिसाब से 300 श्रमिक जुटे हुए हैं। 10 मई तक इसे हर हाल में शुरू करने का लक्ष्य रखा गया है। वहीं अस्पताल वातानुकूलित हो इसका भी इंतजार किया जा रहा है। वहीं मरीजों के साथ के लोगों के लिए जिंदल मार्डन स्कूल के आसपास धर्मशालाएं खोजी जा रही हैं। बायोमैडिकल वेस्ट के लिए कंपनी का चयन भी कर लिया गया है।

सर्वाधिक 1156 नए संक्रमित मिले थे मरीज

जिले में सोमवार को कोविड संक्रमण के मामलों में एक बार फिर बढ़ोतरी दर्ज की गई थी। एक दिन में संक्रमण के रिकॉर्ड 1156 मामले मिले। इसके साथ ही जिले में 1497 संक्रमितों को स्वस्थ होने पर डिस्चार्ज किया गया है। बुलेटिन के अनुसार जिले में 4 लाख 55 हजार 316 लोगों की टेस्टिंग में अभी तक संक्रमण के 32 हजार 687 मामलों सामने आ चुके हैं। इनमें से कुल 25 हजार 208 संक्रमित कोरोना से रिकवर हो चुके हैं। जिला में कुल सक्रिय मरीजों की संख्या में भी कमी आई है। अब 6 हजार 981 कुल सक्रिय मरीज उपचाराधीन है।

<https://www.jagran.com/haryana/hisar-target-to-start-drdo-500-bed-temporary-covid-hospital-by-10-may-in-hisar-21613698.html>

## कश्मीर में DRDO के प्रस्तावित Covid Hospital का काम

### शुरू, जम्मू में अभी तक जमीन चिन्हित नहीं हुई

केंद्र शासित प्रदेश जम्मू कश्मीर में कोरोना संक्रमितों की बढ़ती तादाद से निपटने और उन्हें सभी आवश्यक उपचार सुविधाएं प्रदान करने के लिए डीआरडीओ का प्रस्तावित कोविड अस्पताल कश्मीर संभाग के रेशीपोरा बड़गाम में बनेगा। फिलहाल प्रस्तावित अस्पताल की एप्रोच सड़क का निर्माण कार्य शुरू कर दिया गया है।

By Vikas Abrol

श्रीनगर: केंद्र शासित प्रदेश जम्मू कश्मीर में कोरोना संक्रमितों की बढ़ती तादाद से निपटने और उन्हें सभी आवश्यक उपचार सुविधाएं प्रदान करने के लिए डीआरडीओ का प्रस्तावित कोविड अस्पताल कश्मीर संभाग के रेशीपोरा बड़गाम में बनेगा। फिलहाल, प्रस्तावित अस्पताल की एप्रोच सड़क का निर्माण कार्य शुरू कर दिया गया है। उल्लेखनीय है कि बीते सप्ताह केंद्रीय गृह सचिव के साथ एक बैठक में प्रदेश के मुख्य सचिव बीवीआर सुब्रह्मण्यम ने जम्मू कश्मीर में डीआरडीओ की तरफ से 500-500 बिस्तरों की क्षमता वाले दो कोविड अस्पतालों का निर्माण कराए जाने का आग्रह किया था। केंद्रीय गृह सचिव ने तत्काल इसकी मंजूरी दे दी थी।

संबंधित सूत्रों ने बताया कि जम्मू प्रांत में स्वास्थ्य विभाग प्रस्तावित कोविड अस्पताल के लिए अभी तक जमीन भी चिन्हित नहीं कर पाया है जबकि कश्मीर में कोविड-19 अस्पताल के निर्माण की दिशा में काम में शुरू हो चुका है। उन्होंने बताया कि यह अस्पताल रेशीपोरा बड़गाम में बनाया जाना है। स्थानीय लोगों ने करीब 15 वर्ष पहले वर्ष 2006 में 200 बिस्तर वाले अस्पताल के निर्माण के लिए 78 कनाल सामुदायिक जमीन जम्मू कश्मीर सरकार को प्रदान की थी। उस समय जम्मू कश्मीर में गुलाम नबी आजाद मुख्यमंत्री थे। बीते 15 वर्षों में इस जमीन पर अस्पताल निर्माण के लिए कोई कदम नहीं उठाया गया था। अस्पताल के लिए एप्रोच सड़क हेतु अधिग्रहित तीन कनाल निजी जमीन का मुआवजा दिया गया है।



डीआरडीओ द्वारा 500 बिस्तरों की क्षमता वाला अस्पताल बनाया जाएगा

15 वर्ष पहले अधिग्रहित जमीन पर अब डीआरडीओ द्वारा 500 बिस्तरों की क्षमता वाला अस्पताल बनाया जाएगा और इसके लिए आज एप्रोच सड़क पर काम शुरू हो गया है। संबंधित सूत्रों ने बताया कि अस्पताल का अगले एक दो माह में तैयार कर लिया जाएगा। स्थानीय लोगों ने अस्पताल के निर्माण पर प्रसन्नता जताते हुए कहा कि इसमें जाे भी कर्मचारी, अधिकारी, स्वास्थ्यकर्मी की जरूरत है। वह अस्पताल के लिए जमीन देने वाले गांवों से ही नियुक्त किया जाए ताे बेहतर है। अगर स्थानीय लोगों में से काेई संबंधित कार्याे के लिए योग्य न हाे तो ही प्रदेश के अन्य हिस्सों के लोेगों को इसमें रोजगार का मौका दिया जाए।

<https://www.jagran.com/jammu-and-kashmir/jammu-work-on-drds-proposed-covid-hospital-started-in-kashmir-land-not-yet-identified-in-jammu-21611879.html>



## हल्द्वानी-ऐसे बनाया जायेगा डीआरडीओ द्वारा 500 बेड का अस्पताल, डीएम ने बनाई प्लानिंग

By Jiwan Lal

हल्द्वानी: आज जिलाधिकारी धीराज सिंह गब्याल की पहल पर कोरोना मरीजों के इलाज के लिए राजकीय मेडिकल कॉलेज में डीआरडीओ द्वारा बनाये जाने वाले 500 बेड के फैंब्रीकेटड अस्पताल के निर्माण के लिए डीआरडीओ के प्रोजेक्ट ऑफिसर कोनेरू मेघा साईं रमेश ने जिलाधिकारी धीराज सिंह गब्याल, मुख्य विकास अधिकारी नरेन्द्र सिंह भंडारी तथा अन्य विभागीय अधिकारियों के साथ कॉलेज परिसर में मौका मुआयना किया।



इसदौरान प्रोजेक्ट ऑफिसर कोनेरू मेघा साईं रमेश ने लोक निर्माण विभाग तथा अन्य विभागों से कहा कि वह बनने वाले अस्पताल के लिए अपने विभागों से सम्बन्धित स्टीमेड तीन दिन के भीतर उपलब्ध करा दें तांकि आने वाले दस दिनों के भीतर फैंब्रीकेटड अस्पताल का निर्माण प्रारम्भ कर दिया जाये। जिलाधिकारी गब्याल ने जलसंस्थान, पेयजल निगम, विद्युत निगम, लोनिवि के अधिकारियों से कहा कि यह महत्वपूर्ण प्रोजेक्ट है। लिहाजा सभी इस अस्पताल के निर्माण में प्राथमिकता के आधार पर सहयोग करें तथा निरन्तर डीआरडीओ के अधिकारियों के सम्पर्क में रहते हुए समन्वय बना कर कार्य करें।

मुख्य विकास अधिकारी भण्डारी ने बताया कि मेडिकल कॉलेज परिसर के बड़े मैदान में 500 बेड का कोविड अस्पताल बनाया जायेगा जिसमें 100 बेड ऑक्सीजन युक्त होंगे तथा 125 आईसीयू बेड भी बनाये जायेगे। उन्होंने बताया कि बनाने वाले इस अस्पताल में डॉक्टर एवं पैरामेडिकल स्टॉफ की तैनाती प्रदेश सरकार द्वारा की जायेगी। अस्पताल के स्ट्रेचर आदि का निर्माण डीआरडीओ करेगा जबकि इस अस्पताल के निर्माण लोनिवि सहयोग करेगा, बिजली एवं पेयजल लाईनों के निर्माण में विद्युतए जलसंस्थान तथा पेयजल निगम सहयोग करेगा। भण्डारी ने बताया फैंब्रीकेटड अस्पताल के निर्माण पर लगभग दस से पंद्रह करोड़ रुपये खर्च होने की सम्भवाना है। उन्होंने बताया कि डीआरडीओ द्वारा निर्माण कार्यों के लिए सामान पहुँचाना शुरू कर दिया गया है। हँगर व अन्य सामान मेडिकल कॉलेज में डीआरडीओ द्वारा

पहुँचाना शुरू कर दिया है। उन्होंने बताया कि इस प्रोजेक्ट में डीआरडीओ के कोनेरु मुराली कृष्णा, कोनेरु मेघा साई रमेश, कोनेरु उमा हायमा, अनिल गांधी, पुछाला भास्कर रेडडी, शाइक इम्तियाज भी इस अस्पताल के निर्माण में अपना तकनीकी सहयोग देगे ।

<https://newstodaynetwork.com/uttarakhand/kumaon/haldwani-to-be-built-by-drdo-500bed-hospital-dm-built/cid2833339.htm>



Tue, 04 May 2021

## DRDO कोविड अस्पताल में 20 हजार लीटर आक्सीजन की जरूरत, मिली पांच

शनिवार देर रात 20 हजार लीटर की क्षमता वाला आक्सीजन टैंकर अस्पताल पहुंचा तो डीआरडीओ और सेना के अफसरों की उम्मीद जग गई लेकिन पता चला कि टैंकर में केवल पांच हजार लीटर ही आक्सीजन है। शेष 15 हजार लीटर किसी दूसरी जगह अनलोड कर दी गई।

By Rafiya Naz

लखनऊ: डीआरडीओ अवध शिल्प ग्राम में जिस कोविड अस्पताल को बना रहा है, वहां के ऑक्सीजन टैंक को अब लिक्विड मेडिकल ऑक्सीजन का इंतजार है। शनिवार देर रात 20 हजार लीटर की क्षमता वाला आक्सीजन टैंकर अस्पताल पहुंचा तो डीआरडीओ और सेना के अफसरों की उम्मीद जग गई, लेकिन पता चला कि टैंकर में केवल पांच हजार लीटर ही आक्सीजन है। शेष 15 हजार लीटर किसी दूसरी जगह अनलोड कर दी गई।

डीआरडीओ के अटल विहारी वाजपेयी कोविड अस्पताल में दो आइसीयू वार्ड तैयार हो गए हैं, जबकि दो जनरल वार्ड के सभी बेड पर आक्सीजन लाइन बिछाई गई है। गत 24 अप्रैल को यहां राजस्थान से 20 हजार लीटर की क्षमता का लिक्विड मेडिकल ऑक्सीजन टैंक लगाया गया, जबकि अगले दिन वेपोराइजर मशीन भी लगाई गई। आइसीयू के बेड आने में दो दिन की देरी भी हुई। इस बीच डीआरडीओ ने 30 अप्रैल को अस्पताल के आइसीयू में लगे लाइफ सपोर्ट सिस्टम का ट्रायल भी कर लिया। आक्सीजन की जगह एयर सप्लाई कर लाइन को चेक किया गया था। इस बीच शनिवार रात पांच हजार लीटर आक्सीजन पहुंची तो उसे टैंक में लोड किया गया। सेना के डाक्टरों और मिलिट्री नर्सिंग सेवा की अधिकारियों ने अपनी इयूटी को लेकर अभ्यास भी किया। जिन सैन्य डाक्टरों और मिलिट्री नर्सिंग सेवा अधिकारियों की जहां तैनाती होगी, उन्होंने वहां के सारे उपकरणों को जांचा। अलमारियां लगाकर उनमें इंजेक्शन और दवाओं के वितरण की तैयारियां भी की।



रक्षामंत्री कर रहे निगरानी

डीआरडीओ अस्पताल की मॉनीटरिंग रक्षा मंत्री राजनाथ सिंह लगातार कर रहे हैं। उन्होंने पहले 17 अप्रैल को ट्वीट कर लखनऊ में इस अस्पताल की प्रगति की जानकारी दी थी। इसके बाद 24 अप्रैल को भी रक्षा मंत्री ने छह दिन में अस्पताल शुरू होने की सूचना दी थी।

<https://www.jagran.com/uttar-pradesh/lucknow-city-need-of-oxygen-in-drdo-covid-hospital-lucknow-is-of-20-thousand-liter-got-only-five-21611655.html>

# Defence Strategic: National/International



Press Information Bureau  
Government of India  
Prime Minister's Office

Mon, 03 May 2021 7:23PM

## PM reviews Covid related initiatives by the Indian Navy

**Naval Hospitals being opened for use of civilians in various cities**

**Navy is boosting oxygen availability in Lakshadweep and Andaman & Nicobar islands**

**Navy transporting Oxygen Containers as well as other supplies from abroad to India**

**Medical personnel in the Navy have been redeployed at various locations in the country to manage Covid duties**

Chief of Naval Staff Admiral Karambir Singh called on PM Modi today.

He briefed the PM about various initiatives being taken by the Indian Navy to assist the countrymen during the pandemic. He informed the PM that the Indian Navy has reached out to all state administrations and have offered help in terms of hospital beds, transportation and conduct of vaccination drives. He apprised the PM about beds being earmarked in various naval hospitals for use of civilians in various cities.

He also informed the PM that medical personnel in the Navy have been redeployed at various hospitals in the country to manage Covid duties. Naval Personnel are being provided Battle Field Nursing Assistant Training to augment medical personnel deployed in Covid hospitals.

Chief of Naval Staff Admiral Karambir Singh briefed the PM that

the Navy is helping increase oxygen availability and replenish COVID related supplies in Lakshadweep as well as Andaman & Nicobar Islands.

He also apprised PM that the Indian Navy is transporting Oxygen Containers as well as other supplies from Bahrain, Qatar, Kuwait & Singapore to India.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1715746>





# How Indian Army, Navy & Air Force have joined hands to fight the most lethal enemy ever encountered – Covid-19 pandemic

*By Younis Dar*

It's not only China where the Indian Army, Navy & Airforce have joined hands to battle the threat. The raging Covid-19 pandemic in India has claimed thousands of lives since and the country is struggling to contain the spread of the virus across the states.

And like all other calamities the nation faces, the armed forces of the country have stepped in to help fast-track the transportation of oxygen and other medical supplies to the hospitals across the country.

All three branches of the armed forces – Indian Air Force (IAF), Army and Navy – are engaged in a concerted effort to help reach medical facilities to the citizens of the country, at a time when the government is struggling to meet the challenge created by the double variant of the inexorable Covid-19 virus.

## **Indian Air Force**

While the entire transport fleet of the IAF is busy transporting oxygen containers from manufacturing bases to the hospitals across the country, the Indian Navy ships have been ferrying similar medical material from different countries.

Other defense organizations such as the DRDO (Defence Research and Development Organisation) have been setting up makeshift hospitals across the country, using their technological expertise and manpower.

The IAF has deployed many assets in its transport aircraft, such as C-130s, C-17s, IL-76s to carry cryogenic oxygen containers from foreign as well as domestic sources to different cities in the country.

According to the IAF, as of May 2, its aircraft had carried out 192 domestic sorties and 30 foreign sorties airlifting oxygen containers. It further said that about 269 flying hours were dedicated to helping the country with the oxygen shortage.

IAF C-17s have been airlifting cryogenic oxygen containers from Frankfurt, Germany to Hindan airbase and oxygen cylinders from the UK to Chennai. Containers were also being lifted from airports in Singapore, Dubai, Bangkok and many other nations.

Meanwhile, a source in the IAF told EurAsian Times that the force was suspending leaves of personnel and recalling the off-duty airmen to their bases. He said the efforts to help the government were going on a war footing inside the air force and a significant amount of assets had been deployed to ferry essential medical material to civilian hospitals across the nation.

The ministry of defense approved around 50 Armed Forces Medical Services (AFMS) hospitals (42 Army, 5 Air Force and 3 Navy), designated as “Dedicated & Mixed COVID Hospitals” where besides the serving personnel, dependents and veterans, the civilians were allowed to be admitted based on various conditions set by the ministry.

## **Indian Army**

The Indian army helped to move doctors and medical staff of the armed forces from across the country to Lucknow where the pandemic has taken a devastating turn.

The DRDO is currently setting up a 500-bed hospital in the city, with a facility for 150 ICU beds. “The construction of the facility and the testing of various equipment being done at a fast pace by DRDO and the doctors of the defense forces,” the army said in a statement.

The Indian army also put out an appeal to the veteran officers of AFMS (Armed Forces Medical Services), requesting them to register themselves on the e-Sehat portal to offer their valuable services to countrymen through teleconsultation.

“The veterans constitute a large group of the armed forces family who have served the nation with honor and dignity. They are motivated highly trained professionals who still have a lot to offer for a national cause.”

“Hence, all veteran officers of armed forces medical services are requested to register themselves on e-Sehat portal wherein they can offer their guidance, counseling and advice to many of their fellow countrymen and help provide succor in this hour of need,” the appeal on the social media read.

### **Indian Navy**

The Indian Navy has deployed many of its assets into service, and according to its statement, seven warships were being used to ferry liquid oxygen and medical supplies from various countries. The navy said it was deploying another warship by Monday (May 3) to help in the Covid-19 operations.

On May 1, the navy sent INS Kochi, INS Trikand and INS Tabar to receive and carry liquid medical oxygen-filled cryogenic containers and associated medical equipment from multiple countries. The force had earlier deployed INS Kolkatta and INS Talwar in the Persian Gulf, which have now docked at their home ports.

INS Talwar was engaged to pick up liquid oxygen filled tanks from Manama, Bahrain, while INS Kolkata was sent to Doha, Qatar, for embarking medical supplies and will subsequently head to Kuwait for liquid oxygen tanks, the Navy said.

While helping the nation in the critical supply of oxygen and essential medicine, the armed forces have themselves have been battle-ready for the pandemic, with over 97 percent of personnel having received the first dose of the vaccination. According to reports, about 76 percent of them have received the second dose.

99 percent of personnel in the army are said to have received their first vaccine dose and 82 percent have received both doses.

<https://eurasianimes.com/how-indian-army-navy-airforce-have-joined-hands-to-fight-the-most-lethal-enemy-ever-encountered-covid-19-pandemic/>

## Ashok Leyland to meet defence vehicles' needs despite production cuts

*Indian conglomerate Hinduja Group flagship Ashok Leyland has decided to continue to meet defence vehicles needs despite production cuts across all its facilities*

Indian conglomerate Hinduja Group flagship Ashok Leyland has decided to continue to meet defence vehicles needs despite production cuts across all its facilities.

The scale down in operations is due to drop in demand and supply chain disruption as the country fights a second wave of Covid-19.

In a regulatory filing, the company said: "Ashok Leyland is committed to the wellbeing of our personnel, their families and the extended eco system, including customers, dealers and suppliers.

"The demand outlook for all our products is expected to be affected temporarily. We have carefully studied the demand situation and efforts are being made to match the demand on the one hand, while being cognizant of the disruptions in the supply situation.

"Accordingly, the operations of our plants have been scaled down accordingly and are expected to work for seven-15 days in May. We will continue to respond to the Covid situation in the country as it unfolds."

Meanwhile, the firm will continue to provide essential parts and aggregates support for its commercial vehicle fleet to ensure movement of critical products and services.

Ashok Leyland is one of the largest suppliers of the logistics vehicles to the Indian Army. Its relationship with the Indian armed forces extends to more than four decades.

The company's vehicles are designed to carry military payloads ranging from 2.5t to 30t tonnes and are deployed to perform a wide range of special applications.

Last month, the company delivered light bulletproof vehicles (LBPV) to the Indian Air Force (IAF).

In August 2018, Ashok Leyland won a tender for developmental works for the Indian Army's defence tracked combat vehicles.

<https://www.army-technology.com/news/ashok-leyland-to-continue-defence-vehicles-production-despite-scaling-down-operations/>



Ashok Leyland's corporate head office in Guindy, Chennai. Credit: Ask27.

## AI and quantum computing to be the most impactful next-generation technologies in defence: Poll

*The rapidly advancing technologies such as artificial intelligence (AI) and big data are changing the way militaries are addressing threats*

The rapidly advancing technologies such as artificial intelligence (AI) and big data are changing the way militaries are addressing threats.

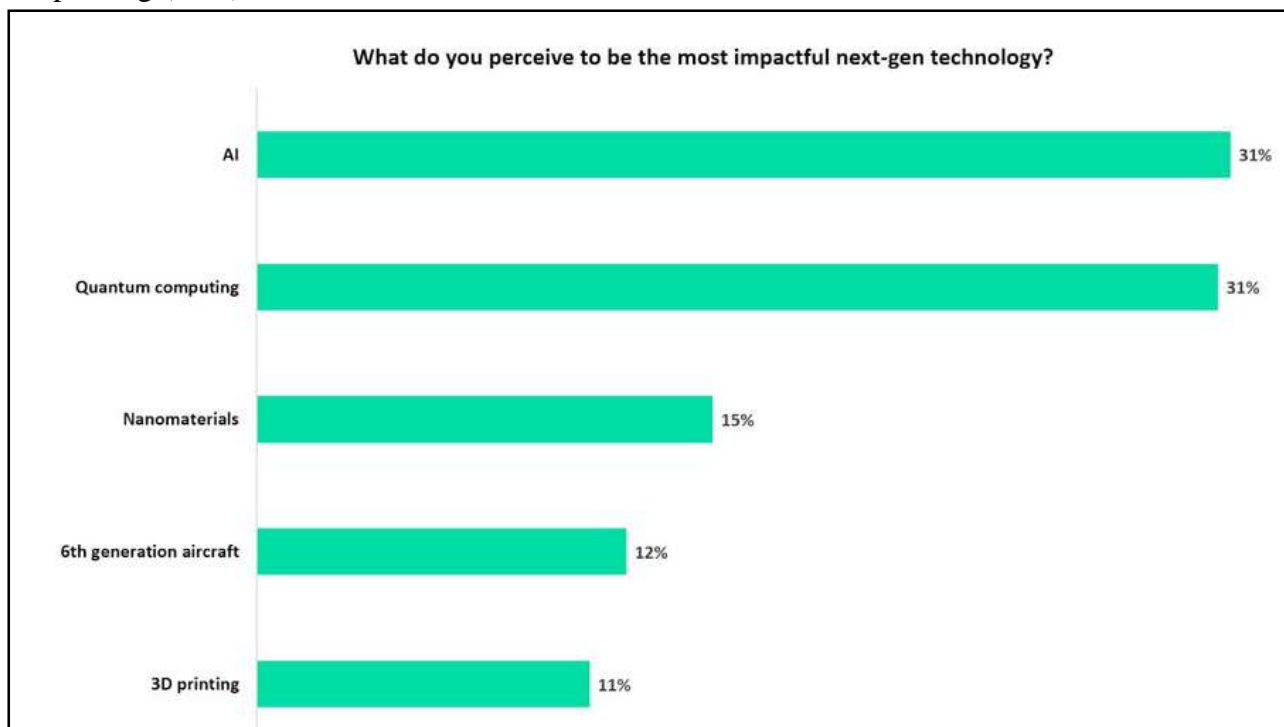
Verdict has conducted a poll to assess the most impactful next-generation technology in the defence sector.

Analysis of poll results shows that AI and quantum computing will be the most effective next-gen technologies in the armed forces, as opined by 31% of the respondents, each.

Further, 15% of the respondents opined nanomaterials to be the most impactful, followed by sixth-generation aircraft (12%) , and 3D printing (11%).



Credit: Panchenko Vladimir/Shutterstock.com.



The analysis is based on 251 responses received from the readers of Airforce Technology, Army Technology and Naval Technology, Verdict's defence sites, between 08 March and 26 April 2021.

### Next-gen technologies in defence

Technologies such as AI, quantum computing, and 3D printing are expected to change the course of combat and warfare in the future. The US is trying to leverage the untapped potential of AI in the domains of command and control by incorporating the technology into drones, ground vehicles, fighter aircraft, and naval vessels.

The AI technology is currently being tested by the US military and will be adapted for safeguarding harbours and hunting down submarines. Technologies such as quantum computing can enable armies to tackle extreme complex situations in the war zone. It can help in solving multiple problems simultaneously and provide the best course of action.

Further, 3D printing can enable militaries to cut production costs, provide new opportunities for design, and produce light weight components. It can also help in avoiding the need to outsource components and parts by producing them in-house using 3D printers.

<https://www.army-technology.com/news/ai-and-quantum-computing-to-be-the-most-impactful-next-generation-technologies-in-defence-poll/>

# ThePrint

Tue, 04 May 2021

## A defence minister with military background — a risk India needs to take

*The Modi government has initiated several defence reforms. But mere political acumen of the defence minister is insufficient to steer them*

*By Lt General Prakash Menon, Edited by Neera Majumdar*

In December 2019, a long-pending and critical evolutionary process of structural reforms in defence was unleashed by the Narendra Modi government. It was a commendable PMO-driven initiative. It encompassed the creation of the post of Chief of Defence Staff, triple hatted as military adviser to the defence minister, the permanent chairman of the Chiefs of Staff Committee and the head of the newly created Department of Military Affairs. Notably, the position has mandated the CDS to establish the Theatre/Joint Commands.

The fact that defence reforms were required to be driven by the PMO reflects the platitude that India requires a strong PMO to override narrow interests of individual central ministries and state governments in order to serve national objectives. It is never the ideal solution, but has been found to be an effective method in a diverse and complex country inhabited by a plethora of domestic power centres. Post-Kargil, the creation of the National Security Council Secretariat (NSCS), directly under the PMO to act as the think tank for it, has strengthened its ability for policy formulation. However, the downside is the human proclivity to pander to perceived desires of strong prime ministers. Such a possibility will be perennial. In the case of this round of defence reforms under the Modi government, national security interests seem to be the predominant driver.



The Ministry of Defence at South Block in New Delhi | Commons

The implementation of the structural reforms in the Ministry of Defence is now a central challenge and a humungous one. Reforms have to be undertaken under the shadows of deepening geopolitical threats and major constraints in financial resources. It is also bereft of political guidance from a National Security Strategy, about which the less said the better. With time and financial resources at a premium, the envisaged defence reforms cannot be left only to the Chief of Defence Staff (CDS) to execute. It requires political oversight and patronage like never before in India's history. Also, mere political acumen of the defence minister is insufficient to steer the reforms.



## **Why India needs a defence minister with military background**

Political acumen now needs sufficient understanding of military matters, preferably along with comprehension of public finances and dynamics of the defence industrial base. The reforms call for choices to be made that has major long-term consequences. Balancing the creation of continental and maritime power is a prime example. This demands knowledge of hard power and its envisaged utility towards achieving political objectives in multiple strategic contexts including the nuclear one. The manifold increase in technological complexity leaves no room for informed choices except through a knowledge base derived from military experience.

It is no coincidence that political heads of several defence ministries across the world are increasingly those who have worn uniform and gained experience in combat. Currently, the US, Russia, China and the UK, apart from several other countries, have persons with military background as defence ministers. Himmatsinhji in the first Nehru cabinet and Jaswant Singh with a very short stint in the Vajpayee cabinet have been two persons with military background who have tenanted the MoD. Both were appointed more for their political skills and not so much due to military experience.

It is perhaps time now for India to have a politician with a military background to head the Ministry of Defence. Such a move is highly desirable and there are various reasons why.

The primary reason is India's growing security concerns. The threat from China is growing for the first time, in both continental and maritime domains. A possible collusion with Pakistan is a distinct possibility and must be factored in for defence preparations, the pace of which is being propelled and shaped by global geopolitical tensions. There is no time to waste. Preparations demand additional fiscal resources that may not easily be provided by a Covid-19-hit economy with the second wave currently running seemingly out of control. For sure, the economic impact will be tremendous. A defence minister with a military background could be extremely useful to mastermind the direction and pace of military preparations in such an environment even while steering reforms.

The primary framework of defence-related decision making in the MoD is about balancing the weight of the strategic objectives with the fiscal support and other means available. This is an art that requires a blend of the political and the military aspects in multifaceted strategic contexts. Obviously, knowledge of both sides is necessary and cannot possibly be easy for full-time politicians who have never worn a uniform. At the defence minister's level, deciding which decision is to be left to the military and what requires a higher perspective of the defence ministry and PMO is key to formulation of actions required. The situation is admittedly worsened by sub-optimum cooperation between the Services and is also one of the major reasons necessitating the reforms. To expect, that since the political leadership has decided, it can be left to the military to take things forward without informed political oversight and patronage, would be a mistake.

### **A calculated risk**

Agreeably, this can also lead to militarisation of our democracy and is not an issue that can be ignored. The lessons of pre-1962 politicisation of the military under Krishna Menon and its implications must serve as a grim reminder. The suggested predominant role of the military in the MoD must be seen as a contingent measure that is temporary and is cognisant of the dangers of military-specific thinking in statecraft. A strong PMO, if backed by an NSCS with intellectual integrity, could exercise sufficient oversight over the reform process, provide valuable strategic national-level insights and push for speedy resources provision. Such a defence minister might be a political lightweight in terms of political popularity. What would matter is the knowledge base they would bring to the discussions held at the Cabinet Committee on Security, the National Security Council, and all other forums national and international.

In any case, the defence minister would have to be politically chosen and has to be someone who enjoys the complete confidence of the PM. Being a political appointment, non-performance can be quickly penalised by depriving the holder of that portfolio. Hence, the PM's control remains

paramount. The major danger and an all-weather threat will be of the military colluding with the PMO for domestic political gains. There is no easy answer to this except that the current external and internal health situations must, for all national security purposes, be treated as sufficiently challenging, to warrant such risk-taking.

India has plenty of talent and intellectual horsepower. After ensuring careful scrutiny, finding a person who acceptably fits the defence minister's qualifying requirements should not be difficult. But this is a major political decision that only the PM can make. The choice has to weigh, greater military effectiveness with the possible militarisation of the polity. Hopefully, the danger of militarisation will remain fettered as long as a strong PMO never uses the military to score domestic political points. If this principle is embraced and maintained, the danger of militarisation is reduced substantially. Given the security environment that is juxtaposed with the misgivings on militarisation, the decision will depend on the answer to the query, will the Indian military ever join hands with politicians to undermine democracy?

According to me – having spent 40 years in uniform – the risk can be taken. After all, the apolitical military vaccine is administered regularly through an institutional culture that the Indian military is proud of. Admittedly, one may be out of date in sensing contemporary reality, but my bet is on the military.

The time is ripe for the change and it may help better address both the major contemporary threats to India – security and health. Health poses the immediate emergency. The health minister must at least take moral responsibility for failure. The politically and administratively proven skills of the current defence minister should be deployed to face the grave and immediate health threat, and the PM can choose any suitable person with a politico-military experience for defence. This move of the ministerial dice is imperative in national interest.

*(Lt Gen Prakash Menon (retd) is Director, Strategic Studies Programme, Takshashila Institution, Bengaluru, and former Military Adviser, National Security Council Secretariat. Views are personal. )*

<https://theprint.in/opinion/a-defence-minister-with-military-background-a-risk-india-needs-to-take/651599/>

## US govt clears sale of six more P-8I aircraft to India, what is P-8I aircraft?

*The proposed sale of an additional six P-8I aircraft will allow the Indian Navy to expand its maritime surveillance aircraft (MSA) capability for the next 30 years*

The US government under the leadership of President Joe Biden on April 30, 2021, approved the sale of six P-8I patrol aircraft to India for an estimated cost of USD 2.42 billion.

The Defense Security Cooperation Agency delivered the certification to notify the Congress of this sale on Friday, April 20, 2021.

The notification informed that this sale would support the foreign policy and act as a booster to the national security of the US in turn, strengthening the US-Indian strategic relationship. This will enhance the security of a major defensive partner in the Indo-Pacific and South Asia region.

The proposed sale of an additional six P-8I aircraft “will allow the Indian Navy to expand its maritime surveillance aircraft (MSA) capability for the next 30 years. India will have no difficulty absorbing these aircraft into its armed forces,” said the notification.



P-8I aircraft, Source: Boeing

The Indian Navy had procured the first P-8I aircraft in 2013. Later, in 2009, the Indian Navy purchased a fleet of eight P-8I aircraft through a direct commercial sale and four additional aircraft in July 2016.

### **About the P-8I Aircraft**

P-8I aircraft is a variant of the Boeing P-8 Poseidon aircraft that serves as a replacement for the US Navy’s P-3 fleet.

The Indian Navy is the first international customer for the P-8 aircraft. The Indian variant of P-8 aircraft is referred to as P-8I.

The P-8I aircraft, as described by the manufacturing company Boeing, are built for anti-surface warfare, long-range anti-submarine warfare, reconnaissance missions, and surveillance.

The Indian variant P-8I aircraft come equipped with:

- 42 AN/AAR-54 Missile Warning Sensors,
- 14 LN-251 with Embedded Global Positioning Systems/Inertial Navigations Systems,
- 8 Multifunctional Information Distribution System-Joint Tactical Radio Systems 5 (MIDS-JTRS 5).

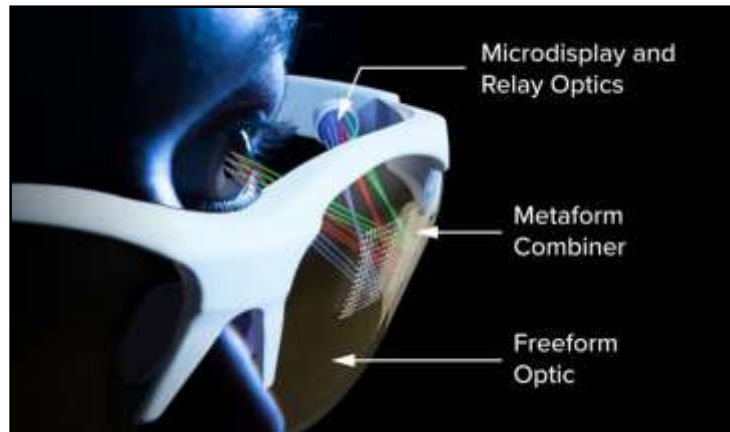
<https://www.jagranjosh.com/current-affairs/us-govt-clears-sale-of-six-more-p8i-aircraft-to-india-what-is-p8i-aircraft-1620040174-1>

## A new way to make AR/VR glasses

"Image" is everything in the \$20 billion market for AR/VR glasses. Consumers are looking for glasses that are compact and easy to wear, delivering high-quality imagery with socially acceptable optics that don't look like "bug eyes."

University of Rochester researchers at the Institute of Optics have come up with a novel technology to deliver those attributes with maximum effect. In a paper in *Science Advances*, they describe imprinting freeform optics with a nanophotonic optical element called "a metasurface."

The metasurface is a veritable forest of tiny, silver, nanoscale structures on a thin metallic film that conforms, in this advance, to the freeform shape of the optics—realizing a new optical component the researchers call a metaform.



A metaform is a new optical component that Rochester researchers say they can combine with freeform optics to create the next generation of AR/VR headsets and eyewear. Credit: University of Rochester illustration /Michael Osadciw

The metaform is able to defy the conventional laws of reflection, gathering the visible light rays entering an AR/VR eyepiece from all directions, and redirecting them directly into the human eye.

Nick Vamivakas, a professor of quantum optics and quantum physics, likened the nanoscale structures to small-scale radio antennas. "When we actuate the device and illuminate it with the right wavelength, all of these antennas start oscillating, radiating a new light that delivers the image we want downstream."

"Metasurfaces are also called 'flat optics' so writing metasurfaces on freeform optics is creating an entirely new type of optical component," says Jannick Rolland, the Brian J. Thompson Professor of Optical Engineering and director of the Center for Freeform Optics.

Adds Rolland, "This kind of optical component can be applied to any mirrors or lenses, so we are already finding applications in other types of components" such as sensors and mobile cameras.

### Why freeform optics weren't enough

The first demonstration required many years to complete.

The goal is to direct the visible light entering the AR/VR glasses to the eye. The new device uses a freespace optical combiner to help do that. However, when the combiner is part of freeform optics that curve around the head to conform to an eyeglass format, not all of the light is directed to the eye. Freeform optics alone cannot solve this specific challenge.

"Integrating these two technologies, freeform and metasurfaces, understanding how both of them interact with light, and leveraging that to get a good image was a major challenge," says lead author Daniel Nikolov, an optical engineer in Rolland's research group.

### The challenge of fabrication

Another obstacle was bridging "from macroscale to nanoscale," Rolland says. The actual focusing device measures about 2.5 millimeters across.

But even that is 10,000 times larger than the smallest of the nanostructures imprinted on the freeform optic.

"From a design standpoint that meant changing the shape of the freeform lens and distributing the nanostructures on the lens in a way that the two of them work in synergy, so you get an optical device with a good optical performance," Nikolov says.

This required Aaron Bauer, an optical engineer in Rolland's group, to find a way to circumvent the inability to directly specify metasurfaces in optical design software. In fact, different software programs were used to achieve an integrated metaform device.

Fabrication was daunting, Nikolov says. It required using electron-beam lithography, in which beams of electrons were used to cut away sections of the thin-film metasurface where the silver nanostructures needed to be deposited. Writing with electron beams on curved freeform surfaces is atypical and required developing new fabrication processes.

The researchers used a JEOL electron-beam lithography (EBL) machine at the University of Michigan's Lurie Nanofabrication Facility. To write the metasurfaces on a curved freeform optic they first created a 3D map of the freeform surface using a laser-probe measuring system. The 3D map was then programmed into the JEOL machine to specify at what height each of the nanostructures needed to be fabricated.

"We were pushing the capabilities of the machine," Nikolov says. Fei Cheng, a postdoctoral associate in the Vamivakas group; Hitoshi Kato, a JEOL representative from Japan, and the Michigan staff of the nanofabrication lab, collaborated with Nikolov on achieving successful fabrication "after multiple iterations of the process."

"This is a dream come true," Rolland says. "This required integrated teamwork where every contribution was critical to the success of this project."

### **What is freeform optics?**

Freeform optics is an emerging technology that uses lenses and mirrors with surfaces that lack an axis of symmetry within or outside the optics diameter to create optical devices that are lighter, more compact, and more effective than ever before.

Applications include 3-D imaging and visualization, augmented and virtual reality, infrared and military optical systems, efficient automotive and LED lighting, energy research, remote sensing, semiconductor manufacturing and inspection, and medical and assistive technologies.

Rolland, Bauer, and collaborators at the Center for Freeform Optics recently published a paper in *Optica* providing an overview of this technology, including the early development of lenses without rotational symmetry; the design, fabrication, testing, and assembly of freeform optics; underlying theory, and outlook for the future.

**More information:** Daniel K. Nikolov et al, Metaform optics: Bridging nanophotonics and freeform optics, *Science Advances* (2021). [DOI: 10.1126/sciadv.abe5112](https://doi.org/10.1126/sciadv.abe5112)

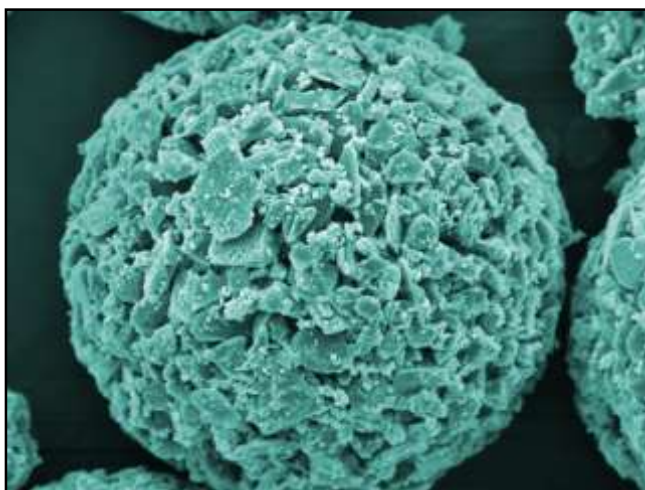
**Journal information:** [Science Advances](https://doi.org/10.1126/sciadv.abe5112) , [Optica](https://doi.org/10.1126/sciadv.abe5112)  
<https://phys.org/news/2021-05-arvr-glasses.html>



## New materials and processes to clean pathogenic microorganisms from water

Removing pathogens from drinking water is especially difficult when the germs are too tiny to be caught by conventional filters. Researchers at Empa and Eawag are developing new materials and processes to free water from pathogenic microorganisms such as viruses.

Water is life, biology teaches us. Reality teaches us something different: Water contaminated with pathogens causes hundreds of thousands of deaths each year in places where water treatment is lacking or poorly functioning. To put an end to this, the availability of clean water for all mankind has been included in the United Nations (UN) Global Sustainability Agenda since 2015. In accordance with this goal, Empa researchers, in collaboration with their colleagues at Eawag, are developing new materials and technologies to remove pathogens from



drinking water, which until now could hardly be eliminated with conventional measures, or only with expensive and complex processes.

Empa researchers are developing novel filter systems made of composite materials such as ceramic granules with a copper nanocoating as depicted here (electron microscopy, colored). Credit: Sena Yüzbaşı / Empa

### Tiny pathogens

The researchers are aiming at the smallest of germs: Tiny pathogens that—unlike the currently circulating coronavirus SARS-Cov-2—are spreading via contaminated water and thus cause various water-borne diseases such as polio, diarrhea and hepatitis. Among these pathogens is the rotavirus, which is only about 70 nanometers in size.

"Conventional water filters are ineffective against rotaviruses," explains Empa researcher Thomas Graule from Empa's High Performance Ceramics lab in Dübendorf. However, it is precisely these tiny germs that are among the most common pathogens causing gastrointestinal infections. According to the World Health Organization (WHO), in 2016 around 130,000 children worldwide died from rotavirus infections. The researchers have now developed strategies for filtration technologies based on new materials that cleverly circumvent the problem of minuteness. This is because one property of the virus particles can be used for a new type of filter: the negative electrical charge of the virus particles.

Based on this idea, the researchers began to develop suitable materials that allow the adsorption of negatively charged virus surfaces. Until now, it has been difficult to create easily regenerated positively charged surfaces with high adsorption capacity, and systematic experimental studies have been scarce. For their investigations, the researchers therefore chose a model virus that is even smaller than the rotavirus: the bacteriophage MS2, which is only 27 nanometers in size—a virus that attacks bacteria but is harmless to humans. Using this model virus, the scientists were able to show that viruses in water adsorb to the filter surface to varying degrees depending on the water's pH. "This must be taken into account when developing new water treatment and filter technologies," says Graule.

In order to develop filter technologies that can capture viruses at the nanometer scale, Graule is focusing on composite materials that are functionalized in such a way that they specifically bind viruses. "In water, the surface of the virus particles is negatively charged. We were able to show

how the virus particles attach themselves to positively charged surfaces," he explains. For example, the researcher is working in an international team on ceramic granules made of aluminum oxide, whose fine granules are coated with nanometer-thin layers of copper oxide. "Together with the ceramic, the highly porous copper layer forms a composite material with a positively charged and immensely large specific surface," says Graule. The researchers were also able to coat tiny multi-layer carbon nanotubes with copper oxide, thus enabling virus elimination.

In order to develop a cost-effective and sustainable filter technology, the researchers specifically utilize materials that can be recovered after use in the sense of a closed material cycle. It is also important that no filter components are washed out into the purified water. To this end, analytical methods for nano-safety still need to be developed so that the most suitable composite material can be determined. At the end of the project, a filter technology is expected to be available that is also suitable for water treatment in developing countries with their particularly high numbers of rotavirus and other water-borne diseases.

Worldwide, around 3.4 million people, mostly children in structurally underdeveloped countries, die every year from water-borne diseases. Among the pathogens are single-cell parasites, such as amoebae and lamblia with a size of up to 40 micrometers. Bacteria such as salmonella, which cause typhoid fever, E. coli germs and cholera pathogens are significantly smaller (0.5 to 6 micrometers), but equally potent pathogens. With a size of 25 to 80 nanometers—about 100 to 1000 times smaller—viruses are the most difficult pathogens to filter out of water. In developing countries the contamination of drinking water with rotaviruses is particularly widespread, followed by other viruses such as the pathogens that cause hepatitis and polio.

Provided by [Swiss Federal Laboratories for Materials Science and Technology](https://phys.org/news/2021-05-materials-pathogenic-microorganisms.html)  
<https://phys.org/news/2021-05-materials-pathogenic-microorganisms.html>



Tue, 04 May 2021

## 1D model helps clarify implosion performance at NIF

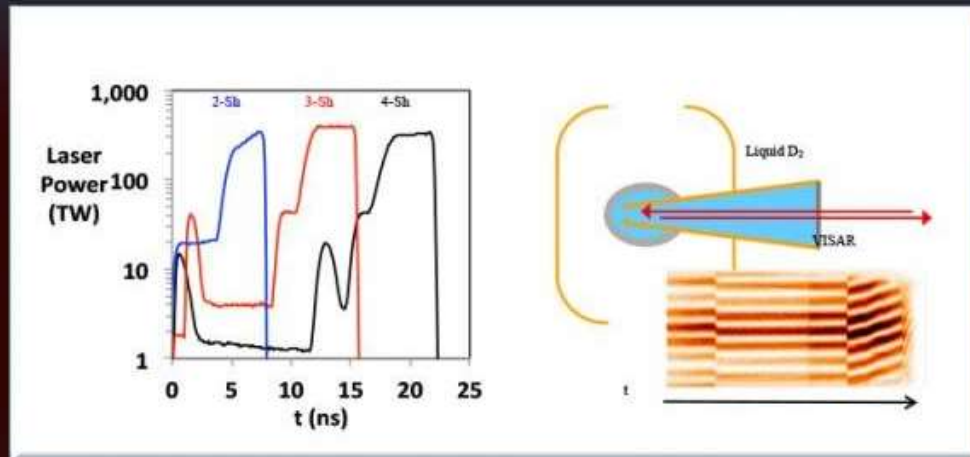
By Michael Padilla

In inertial confinement fusion (ICF) experiments at the National Ignition Facility (NIF), a spherical shell of deuterium-tritium fuel is imploded in an attempt to reach the conditions needed for fusion, self-heating and eventual ignition. Since theory and simulations indicate that ignition efficacy in one-dimension (1D) improves with increasing imploded fuel convergence ratio, it is useful to understand the sensitivity of the scale-invariant fuel convergence on all measurable or inferable 1D parameters.

In a paper featured in *Physics of Plasmas*, researchers have developed a compression scaling model that is benchmarked to 1D implosion simulations spanning a variety of relevant implosion designs. This model is used to compare compressibility trends across all existing indirect-drive layered implosion data for three ablaters.

"The best level of compression of the various designs of indirect-drive implosions at NIF that have used plastic polymer and beryllium shells follow the expectations of a simple physics model," said Otto "Nino" Landen from Lawrence Livermore National Laboratory (LLNL) who served as lead author. "This has allowed us to rule out certain previously hypothesized effects such as hot electron preheat."

A major exception is the high-density carbon shells that have so far exhibited a remarkably constant lower level of compression, independent of the laser drive conditions, he said.



These images depict various laser profiles used in the inertial confinement fusion research and provides the experimental set-up for the VISAR-based shock velocity measurement and representative streaked data. Credit: Lawrence Livermore National Laboratory

"Achieving ignition is fundamentally recognized as a trade-off between more energy coupled to the capsule requiring more efficient hohlraums or a larger laser, and improving the level of capsule compression," Landen said. "So, understanding what the NIF implosion database has told us so far about compression trends as we varied laser and capsule parameters seemed important as a first step to motivating further research in improving compression without necessarily resorting to a higher laser energy demand."

This trending work is part of improving understanding of and optimizing ICF implosion performance on the quest for robust ignition that also could be applied to the direct-drive ICF database.

The work was conducted by first validating a simple analytic model for the level of capsule compression as a function of various laser and capsule parameters by comparing to 1D simulations.

Researchers then compared the compression model scaling to all NIF cryogenic implosions shot to date using a combination of existing optical, X-ray and nuclear data, so essentially a physics-grounded empirical approach. This also required developing approximate analytic models for relating the expected compressibility of the implosion to the X-ray driven pressure profile applied to it in the hohlraum as measured by the NIF VISAR system.

Landen said that since high-density carbon shells are currently giving the best neutron yields despite the reduced compression trends presented in this paper, researchers have increased focus on testing physics-based hypotheses such as hydrodynamic instabilities leading to mixing between the shell and DT, and as yet untested schemes for improving compression in high-density carbon shell implosions.

**More information:** O. L. Landen et al. Fuel convergence sensitivity in indirect drive implosions, *Physics of Plasmas* (2021). DOI: [10.1063/5.0033256](https://doi.org/10.1063/5.0033256)

**Journal information:** [Physics of Plasmas](https://phys.org/news/2021-05-1d-implosion-nif.html)  
<https://phys.org/news/2021-05-1d-implosion-nif.html>

## Study finds one-third of COVID-19 patients experience neurological symptoms

By Jocelyn Solis-Moreira

The research on the short and long-term effects of COVID-19 disease is ongoing. Still, scientists have found severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) affects the brain causing loss of smell and taste, dizziness, muscle pain, fatigue, and other cognitive impairments. However, it remained unknown why certain people developed neurological symptoms while others did not.

Kameshwar Prasad of the Rajendra Institute of Medical Sciences in India and an international team of researchers conducted the most extensive systemic review and meta-analysis of past COVID-19 cases involving any type of neurological complications.

The authors write:

“Our review shows that pre-existing neurological conditions are a common comorbidity associated with COVID-19. After hypertension and diabetes, the combined comorbidity of cardiovascular/cerebrovascular disease was



Study: Frequency of neurological manifestations in COVID-19: a systematic review and meta-analysis of 350 studies. Image Credit: Lightspring / Shutterstock

the third most commonly reported comorbidity associated with COVID-19.”

They found one-third of patients with COVID-19 infection experienced at least one neurological manifestation. One in fifty patients had a stroke. Age also plays a risk with people over the age of 60 developing neurological symptoms associated with increased mortality.

The team hopes that their findings could help with clinical practice and future research in understanding the severity and mortality of COVID-19 infection. It could potentially help clinicians with treating neurological manifestations during infections and those that persist in long COVID.

The study “Frequency of neurological manifestations in COVID-19: a systematic review and meta-analysis of 350 studies” is available as a preprint on the *medRxiv*\* server, while the article undergoes peer review.

### Collecting data

The team conducted a literature search reviewing COVID-19 cases from December 31, 2019, to December 15, 2020. Studies were included in the review if they featured patients positively diagnosed with COVID-19 and presented with one or more neurological symptoms temporarily associated with infection. The neurological symptoms had to have not been explained by an alternative health reason. The team also included cases that could have potentially been cases of SARS-CoV-2 infection, but there was a lack of diagnostic testing.



The meta-analysis included 350 studies from 55 countries. A total of 20 studies including patients with COVID-19 younger than 18 years old and 14 studies only included patients over the age of 60.

There were 145,634 patients with SARS-CoV-2 infection included in the analysis. About 54% of patients were male, and 89% of patients required hospitalization. Some patients with neurological symptoms had pre-existing conditions, with the highest being hypertension at 26%, followed by diabetes at 14%.

### **Prevalence of neurological manifestations during infection**

The most common neurological symptoms included fatigue (32%), muscle pain (20%), muscle pain or fatigue (31%), dizziness (7%), loss of smell (19%), loss of taste (21%), and headache (13%).

About 11% of patients experienced brief episodes of confusion/delirium, 7% had impaired consciousness, and 45% had agitation.

In 33 studies, there were about 17 different neurological diagnoses in patients with COVID-19, indicating a broad spectrum of neurological manifestations.

Of these, 2% of patients experienced a stroke.

The researchers also found a 24% prevalence for neuropsychiatric disorders and a 5% risk for muscle injury.

### **Specific neurological factors may be linked to severity of disease**

Patients with severe COVID-19 disease were associated with skeletal muscle injury or damage, impaired consciousness, and fatigue.

However, patients with severe COVID-19 infection were less likely than patients with mild infection to have changes in smell or taste.

Results showed that about half of patients who did not require hospitalization had a loss of smell, with 44% reporting loss of taste. Other common symptoms included headaches and muscle pain.

### **Age differences in neurological manifestations during infection**

The team's systemic review included 3,176 older patients with a range of ten different neurological symptoms. Older adults were more likely to experience acute confusion or delirium, fatigue, muscle pain, dizziness, and headache.

Adolescent patients with SARS-CoV-2 infection were more likely to report fatigue or muscle pain, loss of smell or taste, headache, fatigue, and seizure.

About 27% of patients with COVID-19 disease and neurological symptoms died. People over the age of 60 were significantly linked to an increased risk of dying from the disease.

### **\*Important Notice**

*medRxiv* publishes preliminary scientific reports that are not peer-reviewed and, therefore, should not be regarded as conclusive, guide clinical practice/health-related behavior, or treated as established information.

Journal reference:

- Misra S, et al. Frequency of neurological manifestations in COVID-19: a systematic review and meta-analysis of 350 studies. *medRxiv*, 2021. doi: <https://doi.org/10.1101/2021.04.20.21255780>, <https://www.medrxiv.org/content/10.1101/2021.04.20.21255780v1> <https://www.news-medical.net/news/20210503/Study-finds-one-third-of-COVID-19-patients-experience-neurological-symptoms.aspx>



