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*Wed, 20 Jul 2022*

### **CGDA's New Mandate to Audit Military, DRDO: A Crucial Policy Move, But there is a Catch**

Last week, the defence ministry brought in an important policy change that got little public attention. Through an order issued on July 15, it widened the scope of the Controller General of Defence Accounts (CGDA)'s role to include performance and efficiency audits of the activities undertaken by the defence services and organisations under itself as well. So far, the CGDA had the mandate of conducting internal audits on compliance to various rules and regulations. As per the government, a performance and efficiency audit will provide critical inputs to the top management of the defence ministry on shortcomings noted in “planning and execution of projects”, and suggest “systemic improvements in internal controls, soundness of financial procedures, identification of risk factors”, among other things. What makes the move critical and also timely is the huge delegation of financial powers to competent financial authorities at all levels — service headquarters to lower field formations — both on the revenue and the capital side in the last eight years.

Among other things, this has led to multiple procurements of defence platforms and equipment as well as spares to keep them running and initiated new projects through the usual procurement route and under emergency powers as well. Government officials tell me a need was thus felt to seek assurances over the utilization of such powers to meet the stated objectives. They say a relook on these procedures was needed, so that systemic improvements could be suggested, such as shortening the procurement cycle, outsourcing in non-core areas, among others. This is what gave way to the decision to upgrade its internal audits and set up a system to mitigate risks with respect to the various activities undertaken by the defence services and organisations under the defence ministry—covering defence procurements, provisioning, logistics, inventory levels, maintenance of platforms and assets, to name a few. Applicable in any project, risks mentioned here could include project delays, cost overruns, poor quality standards, misappropriation of funds, and failure of sellers to provide services to a few, to name some.

As part of the move, an apex panel was constituted with the defence secretary as its chairman with vice chiefs of the three services, secretary defence (finance), chief of integrated staff committee (CISC), director general (acquisition), CGDA and other senior officials of the Defence Research and Development Organisation (DRDO) and the ministry of defence as

members. As per the government, the panel will identify specific areas for the conduct of CGDA audits, monitor performance audit reports and actions taken on them. It will also advise the defence minister on corrective measures to be taken and ways to strengthen the internal oversight and risk management framework.

### **What prompted this order?**

While the defence ministry has been working on this move for the last few months, the idea first came from a recommendation of the Arun Singh committee on defence expenditure set up in 1990. The committee had recommended that the CGDA should conduct performance and efficiency audits. The recommendations made by several expert committees over the years are being reviewed by the defence establishment, to implement those relevant today. Additionally, a 2006 finance ministry order on the Scheme of Integrated Financial Advisor (IFA) had also stated that the internal audit wings working under the Controller of Accounts should be assisting the financial advisors in the appraisal, monitoring, and evaluation of individual schemes, aside from the regular compliance or regulatory audits. There are instances galore where CAG reports have criticised the inefficient scaling process carried out by the armed forces and excess procurements of defence platforms, equipment or spares, after audits found they were either unnecessary or have been hardly utilised. A stronger, all-rounded internal oversight mechanism may bring down such instances.

At the same time, many may also argue about the need for this additional CGDA oversight when the Comptroller and Auditor General of India is already entrusted with the job of carrying out external audits on all government bodies and the jobs performed by them. However, it is pertinent to note that CAG audits are on a specific sample size and are more generic in nature. CGDA, on the other hand, might be able to carry out a more detailed audit on matters of defence.

### **The Catch**

The catch here is the humongous challenge that lies before the CGDA in meeting its expanded mandate. Carrying out an outcome-based performance or efficiency audit will be a paradigm shift for the CGDA from its existing mandate of conducting transaction-based compliance audit. The organisation may first need to ramp up its manpower. Towards this, the CGDA may look at reorienting its finance officials who have been freed up with the dissolution of the Ordnance Factory Board last year and create a specialised stream of internal auditors. Additionally, the organisation may have to change its traditional approach and undertake specialised training for officials to equip them with the knowledge and enhance their capability required to perform the new role. The organisation will also need to standardise a process for carrying out the audits. Performing the audits within specific timelines may turn out to be another challenge. With the new mandate, there would be expectations of faster delivery so that there is less flak from the CAG on any defence matter. The CGDA will have much on its plate to finish before it dives into its new mandate.

<https://www.news18.com/news/india/defence-diary-cgdas-new-mandate-to-audit-military-drdo-a-crucial-policy-move-but-there-is-a-catch-5587729.html>

## **Defence Ministry Says India to Collaborate with Foreign Company to Develop, Produce Combat Jet Engines for AMCA**

Minister of State for Defence, Ajay Bhatt said in the parliament that India intends to collaborate with a foreign engine company to develop and manufacture combat jet engines for the ambitious Advanced Medium Combat Aircraft (AMCA). Bhatt in a written reply to the upper house of the Parliament, Rajya Sabha, made the comments for the AMCA which is currently the only 5th generation fighter under development in the country. Bhatt also said in a written reply that the Defence Research and Development Organisation (DRDO) has signed 1,464 'Transfer of Technology' (ToT) agreements with Indian companies to date, PTI reported. The DRDO is working relentlessly, or enhancing self-reliance in the defence sector by providing home-grown indigenous state-of-the-art defence technologies to industries, as a continuous process, said Bhatt.

The DRDO develops technologies mainly defence-based tech indigenously and then transfers them to Indian industries and 1,464 such technology transfer licensing agreements have been made by DRDO to Indian companies so far. Bhatt also shared other data related to defence procurements including foreign as well as domestic. He said in the parliament that India procured 36.25 percent of items for defence from foreign countries in the year 2021-22. Foreign defence procurement has come down significantly following the 'Aatmanirbhar' policy in the defence sector. In the year 2019-20, foreign defence procurement share was at 41.18 percent as India used to buy most of its arms from other countries. It is expected to come down even further.

<https://www.timesnownews.com/mirror-now/in-focus/defence-ministry-says-india-to-collaborate-with-foreign-company-to-develop-produce-combat-jet-engines-for-amca-article-92996654>



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Wed, 20 Jul 2022 1:00 PM*

## **'Swavlamban' – Indian Navy's Maiden Naval Innovation and Indigenisation Seminar**

'Swavlamban', the maiden seminar of the Naval Innovation and Indigenisation Organisation (NIO), was held at New Delhi on 18-19 July 2022. Sh Narendra Modi Hon'ble Prime Minister graced the occasion as the Chief Guest. Shri Rajnath Singh, Hon'ble Defence Minister was the Guest of Honour. The two day seminar saw enthusiastic participation by the academia, industry, policy makers, think tanks, students and senior government officials, in addition to the naval

personnel. Personnel at Command Headquarters and outlying units of the Navy also assembled at designated auditoriums spread across the country to participate online. The morning inaugural session commenced with the Welcome Address by Rear Admiral Vineet McCarty, Assistant Chief of Naval Staff (Staff Requirements), which was followed by the address by the Defence Secretary, Dr Ajay Kumar. Keynote address was delivered by Vice Admiral SN Ghormade, Vice Chief of Naval Staff. President SIDM (Society of Indian Defence Manufacturers) provided the industry perspective. Exchange of MoUs and release of the Indian Naval Directory of Industry Partners (INDIP) were also undertaken in the inaugural session.

Four interactive sessions explored specific themes on Day 1. The session on innovation examined the Role of Industry, Academia and Policy in Accelerating Niche Technology Induction into the Indian Navy. The journey of NIIO thus far and the way ahead was deliberated. The second interactive session with focus on naval armament discussed the Ways to Harness the Potential of Indian Industry to realise AatmaNirbharta in this niche field. The third session with aviation as its focus examined the Future of Aviation in the Era of Algorithmic Warfare. The final interactive session had the theme of indigenisation towards self-reliance and debated Means to Enhance Domestic Defence Production, Associated Challenges and Way forward. The plenary session was attended by the Hon'ble Prime Minister along with other dignitaries and senior government officials. The Chief Guest was escorted around the exhibition put up by the industry and shown a demo of 'Varuna' Personal Air vehicle – an autonomous multi-copter drone capable of carrying a passenger. The contribution being made to the defence eco-system by veterans was emphasised.

The highlight of the seminar was the release of the iDEX DISC7 (SPRINT) challenges by the Prime Minister. SPRINT (Supporting Pole-vaulting in R&D through iDEX, NIIO and TDAC) is a collaborative project between the Defence Innovation Organisation (DIO) and NIIO aimed at developing atleast 75 indigenous technologies / products as a part of Azadi Ka Amrit Mahotsav. The challenges span across a wide range of niche technology fields including Artificial Intelligence (AI), autonomous and unmanned systems and Information Technology. Challenges will be considered under both DISC (Defence India Startup Challenge) and Prime categories of iDEX which have provisions for grants upto Rs 1.5 crore and Rs 10 crore respectively. In addition, suo moto proposals submitted by innovators and startups under the IDEX Open Challenge category are also being considered under SPRINT. To ensure that the ambitious timelines are met, multiple levels of monitoring will be implemented. Points of Contact for close liaison and regular monitoring of these cases have been identified by NIIO and DIO. In addition, periodic reviews by the NIIO Working Group and the Naval Technology Acceleration Council (NTAC) which is Chaired by Vice Chief of the Naval Staff will be carried out.

The second day of the seminar was reserved for outreach to the Indian Ocean Region (IOR) in accordance with the Government's articulated vision of SAGAR (Security and Growth for All in the Region) and opportunity was accorded to the industry to showcase their 'export ready' products to the friendly foreign countries. This part of the seminar was witnessed by Defence Attaches of IOR countries posted at New Delhi while Indian Naval officers posted abroad liaised with the countries of their posting for participation. Officers from over twenty five countries participated. The maiden seminar is 'historic' both in scope and ambition and will foster a new chapter in the naval thrust towards self-reliance in defence and an AatmaNirbhar Bharat.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1842970>



*Wed, 20 Jul 2022*

## **Indian Navy to Drive Innovation through Startups**

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<https://www.financialexpress.com/defence/indian-navy-to-drive-innovation-through-startups/2600437/lite/>



*Thu, 21 Jul 2022*

## **The Next Generation: An Overview of Indian Navy's Surface Fleet Plans**

India's defence budget for 2022-23 had allocated a record amount of \$6.19 billion for capital procurement by the Indian Navy, with an eye on attaining the planned fleet strength of over 170 ships and submarines by 2027. Project-17 Alpha (P-17A) class frigates, four follow-on Talwar class frigates and the Project-15 Bravo (P-15B) destroyers are the major surface combatants currently being constructed for the Indian Navy. Smaller vessels include Anti-Submarine Warfare Shallow Water Craft (ASW SWC) and survey vessels among others. The Indian Navy, in accordance with its Long Term Integrated Perspective Plan (LTIPP) and Maritime Capability Perspective Plan (MCP), has over the years indicated the next generation of vessels it requires. This article will provide an overview of the known plans for the Indian Navy's future manned surface fleet reports Overt Defense.

### **Small Surface Vessels And Auxiliary Ships**

The first among the next generation projects is the Next Generation Missile Vessel (NGMV). Six of these are to be built by Cochin Shipyard Limited (CSL) which won the bid in 2021. CSL CMD Madhu S Nair told investors in May that negotiations with the Navy have been completed adding that while CSL expected award of contract by June, it may be delayed to up to September. The six vessels, costing about \$1.3 billion, would take over eight years to build. These would be armed with eight BrahMos missiles, VL-SRSAM for air defence and various guns. A contract for 11 Next Generation Offshore Patrol Vessels worth over \$1.2 billion would be formally awarded this year. Bids were opened in February and Goa Shipyard Limited (GSL) was L1 while GRSE was L2. GSL would build seven vessels while GRSE would build the other four. GRSE aims to build all four ships by 2029.

The Defence Acquisition Council on June 6 approved the procurement of Next Generation Corvettes (NGC), worth an estimated \$4.6 billion. A Request for Information (RfI) in 2016 had



called for procurement of seven such 120m long vessels, armed with at least eight BrahMos missiles, a 76mm gun, AK-630 CIWS, torpedoes and MRSAM missiles. However, the total estimated cost for the NGCs was quoted at \$2 billion as recently as February 2022, which is substantially lower than the current estimate. While media reports indicate that eight NGCs will now be procured, no official figures have been provided. A Request for Proposal (RfP) for NGC will be released by the end of 2022. Mazagon Dock Shipbuilders Limited (MDL) and GRSE are expected to be the main contenders.

A list of acquisitions planned by the Navy in 2022-23 was presented to a Parliament committee in late 2021. This includes Next Generation Survey Vessels, a class of at least seven Next Generation Fast Attack Craft for which RfP is expected in 2023 and an unknown number of Next Generation Fast Interceptor Craft. Major auxiliaries planned include a National Hospital Ship for which an RfI was issued in May and a long delayed contract for five Fleet Support Ships. These ships worth \$2.6 billion would be built by Hindustan Shipyard with technology transfer from Anadolu Shipyard in Turkey. A contract is expected to be signed by the end of 2022. Besides these, a number of smaller auxiliary vessels are also required by the Navy.

### **The Minesweeper Gap**

Conspicuous by its absence in the list was the requirement for Mine Countermeasure Vessels (MCMV). The Navy has been attempting to procure 12 MCMVs since 2004. Repeated failures which left it without any minesweepers by 2019 prompted the Navy to issue an RfI for leasing three to four MCMVs in 2021, but no progress has been reported. The Navy is currently reliant on eight Thales mine countermeasure clip-on sweeps. It also operates Liquid Robotics Waveglider buoyancy gliders which may have additional MCM capability. Liquid Robotics did not respond to a query by Overt Defense regarding this. With requirements having been projected for high endurance autonomous underwater vehicles with MCM modules, portable UUVs for ordnance disposal, expendable underwater mine disposal systems, unmanned surface vessels with MCM modules and more buoyancy gliders, the Navy may be looking to offset its lack of minesweepers with distributed unmanned MCM capability.

### **Aircraft Carriers**

The Indigenous Aircraft Carrier (IAC) Vikrant is likely to be inducted into the Navy in August. Media reports have indicated that the planned IAC-2 carrier is likely to be on the back burner, with the Ministry of Defence (MoD) likely to focus on construction of nuclear powered attack submarines. Nonetheless, the planned list of acquisitions includes the IAC-2. An RfP for four Landing Platform Docks (LPD) worth an estimated \$3.3 billion is expected by 2023. The vessels, capable of carrying over a dozen helicopters, would be completed in eight years after award of contract. An RfI issued in 2021 called for the LPDs to be armed with 16 surface to surface missiles and 32 VL-SRSAM missiles. Other requirements resemble those of traditional LHDs rather than LPDs. The LPDs and IAC-2, which would have Integrated Electric Propulsion (IEP), will form the core of the Navy's shipborne naval aviation capability.

### **Large Surface Combatants**

The future surface fleet would be spearheaded by a class of Next Generation Destroyers (NGD). MDL transcripts from 2021 had pegged five NGDs at \$6.5 billion and expected an RfI by 2025. The program was described as being at a conceptual stage. Yet progress is expected soon as NGDs were also present in the planned acquisitions list for 2022-23. MoD's Technology

Perspective and Capability Roadmap released in 2018 had indicated that the Navy has a requirement for 5-10 “NGD/Next Generation Frigates (NGF)”. However, it was unclear then if both NGD and NGF are to be pursued. Overt Defence understands that in June, the MoD had asked the industry to provide their manufacturing readiness for dozens of new land based and naval equipment. This includes Project-17 Bravo (P-17B), which will be a follow-on order for P-17A class frigates. It also includes both the NGD and NGF separately, confirming that both projects are on the anvil. It is possible that the NGF project may be initiated only after progression of P-17B, which itself is likely to be contracted only by 2025-26 when all P-17A frigates would be ready for service.

NGD and NGF are likely to be equipped with universal vertical launchers, being developed by DRDO, which will be capable of launching all indigenous missiles. The primary ship borne radar is expected to be Long Range Multi Function radar (LRMFR), which is under development. These ships may also be equipped with hypersonic missiles, long range surface to air missiles, directed energy weapons and ‘Torpbuster’ anti-torpedo torpedoes, all of which are being developed. Ballistic missile defence capability may also be incorporated. A defining feature of these ships could be the absence of the ubiquitous RBU-6000 anti-submarine rocket launchers. With better stealth features and the possibility of IEP, timely execution of NGD and NGF could potentially allow the Indian Navy to maintain its edge in the Indian Ocean Region despite the increasing cooperation between its adversaries.

<http://www.indiandefensenews.in/2022/07/the-next-generation-overview-of-indian.html>



*Wed, 20 Jul 2022*

## **ASEAN Nations Look to Hindustan Aeronautics for Military Platforms: CMD, HAL**

Various countries in the ASEAN region have evinced interest in Hindustan Aeronautics Limited (HAL) platforms, particularly, the Light Combat Aircraft (LCA) ‘Tejas’ and Light Combat Helicopter (LCH) platforms based on fleet replacement requirements. In an exclusive conversation with Financial Express Online, R Madhavan, CMD, HAL said, “HAL has been pursuing such overseas opportunities and has offered these platforms to various countries, with the support of Indian Missions.” He was responding to a question about countries in the region looking at not only the LCA, ALH but LCH too. “The leads are being actively pursued and a demonstration of the LCA Tejas was made by the IAF at the Singapore Air Show in February 2022,” HAL CMD added.

According to him state-owned HAL is also pursuing opportunities for export of such platforms by participating in various Defence Exhibitions in the countries of ASEAN region. Asean is a 10-member regional bloc. It includes countries like Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Brunei, Cambodia, Vietnam and Myanmar. After inducting batteries of anti-ship BrahMos missiles, the Philippines is looking at upgrading its military aircraft fleet with Light Combat Aircraft (LCA), Advanced Light Helicopter and Light Combat Helicopter from

HAL. To help in the export of these platforms, a MoU is already in place between HAL and Philippine Aerospace Development Corporation (PADC). The Philippine Air Force is flying the FA-50PH. These aircraft according to the information available in the public domain are more than a supersonic trainer aircraft built by South Korea. And the assault helicopters it has in its fleet are from Turkey.

According to diplomatic sources, the Asean member nation is actively seeking helicopters and fighter jets to modernize its Air Force. China continues its bullying tactics in the West Philippines Sea, which the Philippines consider as its Exclusive Economic Zone (EEZ). China wants that to remain as part of the South China Sea over which it claims its full hold. According to reports, the Asean country is keen to procure a big number of ALH from HAL to replace its ageing helicopter fleet. The negotiations between the two sides is going on and the deal is expected to be closed "soon."

### **More about ALH & LCA**

This helicopter is designed and developed in India and it is a twin engine, multi-role and multi-mission new generation helicopter. It belongs to the 5.5 ton weight class and can be deployed for different military operations. The government of that country is also looking at the Light Combat Aircraft. Malaysia, another Asean country, is set to close the deal by September 2022. This aircraft too is designed and developed in India and is being built by HAL. A highly agile multi-role supersonic fighter aircraft, it is single engine and has the capability to operate in a high threat air environment. Talks are going on with a couple of countries in the region to set up a Maintenance, Repair and Overhaul (MRO) facility which would be used for providing services to military and civil aircraft.

<https://www.financialexpress.com/defence/asean-nations-look-to-hindustan-aeronautics-for-military-platforms-cmd-hal/2600801/lite/>



*Thu, 21 Jul 2022*

## **Where does India Stand on the New Hypersonic Missiles Arms Race**

The race to develop a hypersonic missile further intensified on Tuesday after the United States of America (USA) said it conducted a successful test of a Raytheon Technologies Corp air-breathing hypersonic weapon, which is capable of travelling five times faster than the speed of sound. This was the third successful test of that class of weapon since 2013. "The test demonstrated how we've rapidly matured affordable scramjet technology, which is the basis for air-breathing weapons," said Colin Whelan, president of Advanced Technology for Raytheon Missiles & Defence. "Our second HAWC flight test success is an important milestone for our nation as we advance hypersonic systems." Several countries, including the US, Russia, and China, are actively working on hypersonic missiles. Reports suggest India and North Korea are also working on such weapons, but there is no official confirmation regarding the same.

These frequent tests have brought attention to why countries are developing hypersonic missiles which experts believe pose a 'unique threat' to the world. To delve into the answer to this question, we would first need to understand what is a hypersonic missile and how it works.

### **What Is A Hypersonic Missile?**

First of all, you need to know that a hypersonic vehicle can travel faster than the speed of sound, which is 1,225 kilometers per hour. Hypersonic systems, which have been in use for decades, operate at a speed of 5,633 kilometers per hour. They are non-ballistic, the opposite of the traditional intercontinental ballistic missile (ICBM) that uses gravitational forces to reach its target. There are three types of hypersonic missiles - aero-ballistic, glide vehicles, and cruise missiles.

### **How Do Hypersonic Missiles Work?**

Hypersonic missiles launch a warhead that can travel faster than the speed of sound, often manoeuvring at relatively low altitudes. Analysts say their main feature is their manoeuvrability. Combining a glide vehicle with a missile that can launch it partially into orbit - a so-called fractional orbital bombardment system (FOBS) - could strip adversaries of reaction time and traditional defences mechanisms. ICBMs, by contrast, carry nuclear warheads on ballistic trajectories that travel into space but never reach orbit, reported Reuters.

### **Why The Race To Develop A Hypersonic Missile Has Intensified**

According to Iain Boyd, professor of Aerospace Engineering Sciences at the University of Colorado Boulder, the race to develop a hypersonic missile has intensified because they are difficult to defend "due to their speed, manoeuvrability and flight path". "With all of this activity on hypersonic weapons and defending against them, it is important to assess the threat they pose to national security," he said while writing for The Conversation. "Hypersonic missiles with conventional, non-nuclear warheads are primarily useful against high-value targets, such as an aircraft carrier. Being able to take out such a target could have a significant impact on the outcome of a major conflict."

### **Where Does India Stand?**

According to a report by Congressional Research Service (CRS) of the US, India is among the select few countries which are developing hypersonic weapons. It said although the US, Russia and China possess the most advanced hypersonic weapons programs, a number of other countries, including Australia, India, France, Germany and Japan, are also developing hypersonic weapons technology. India has collaborated with Russia on the development of BrahMos-II, a Mach 7 hypersonic cruise missile, the report said. "Although BrahMos-II was initially intended to be fielded in 2017, news reports indicate that the program faces significant delays and is now scheduled to achieve initial operational capability between 2025 and 2028." "Reportedly, India is also developing an indigenous, dual-capable hypersonic cruise missile as part of its Hypersonic Technology Demonstrator Vehicle program and successfully tested a Mach 6 scramjet in June 2019 and September 2020," it added.

<http://www.indiandefensenews.in/2022/07/where-does-india-stand-on-new.html?m=1>

Thu, 21 Jul 2022

## First S-400 Deployed, Second in Process: IAF Chief

India has inducted and deployed the first firing unit of 'S-400 Air Defence System' and the second unit is also in the process of getting inducted, IAF Chief Air Chief Marshal VR Chaudhari informed on Sunday. "The induction program of S-400 is going as per the schedule. The first firing unit has been inducted and deployed. The second unit is also in the process of getting inducted. Delivery schedules are on time, hopeful that by the end of next year all deliveries will be completed," said the Air Chief Marshal. Informing about the threats on multiple fronts, the IAF Chief said, "The capabilities of the Air Force in handling two fronts at a time will necessarily have to keep getting bolstered by the induction of various platforms." On the ground, we will need more radars, and additional Surface-to-Air Guided Weapon (SAGW) systems and all of these are going to come from indigenous sources, for which the action is already at hand," he said while speaking on the IAF preparedness to deal with the threats on the borders.

Notably, India-Russia signed the S-400 Missile deal in October 2018. S-400 is a potent air defence system in terms of its operational capability, which provides a continuous and effective air defence to a wide range of areas.

### What Is S-400?

Considered one of the most advanced and potent air defence systems, S-400 is equipped to protect against almost all sorts of aerial attacks, including rockets, drones, missiles, and even fighter aircrafts. Further, the S-400 Air Defence System is intended to act as a shield over a particular area, and is a long-range surface-to-air missile system. Each unit of S-400 consists of two batteries, each of which has a command-and-control system, a surveillance radar, and engagement radar and four launch trucks. Notably, S-400 detects an aerial threat approaching the air defence bubble (the area it has to protect), and calculates the trajectory of the threat, and fires missiles to counter it.

### IAF's Aatmanirbhar Bharat Push

The Indian Air Force is fully in sync with the nation's Aatmanirbhar Bharat push which has resulted in the "quick induction" of platforms such as the light-combat helicopter and aircraft, and radar systems. "We are fully in sync with the government's push for self-reliance and Make-In-India. In the DPSUs, we have had project management teams, which have been synchronising our efforts along with those of the industry. The result of this has been the quick induction of platforms such as the light-combat helicopter and aircraft, and radar systems," IAF Chief Air Chief Marshal VR Chaudhari informed. Now we are making an all-out effort to reach out to the private industry and also to the MSMEs. We have a lot of plans to involve the MSMEs in our future growth," the IAF chief added. Air Chief Marshal Chaudhari also exuded confidence in the Indian industry and said that "it may take a little longer but they will definitely deliver".

<http://www.indiandefensenews.in/2022/07/first-s-400-deployed-second-in-process.html>



*Wed, 20 Jul 2022*

## **Race begins! F/A-18 Super Hornet Next-Generation Block III Capability will be Game Changing for India: Boeing**

Even as the Indian Navy's assessment report is awaited, the US aerospace Boeing Company says that two F/A-18E Super Hornet fighter jets have completed operational demonstration tests successfully. These demonstration tests took place at INS Hansa in Goa in June. According to an official statement issued by the company the successful demonstrations have reinforced the F/A-18 ability to effectively and safely operate off Indian Navy carriers. Two US Navy F/A-18E during the tests completed multiple ski-jumps, roll-in and fly-in arrestments, as well as performance flights. These involved a variety of weights in the air-to-surface, air-to-air, and air-to-ground configurations, meeting the requirements of the tests as specified by the Indian Navy.

According to Alain Garcia, vice president, India business development Boeing Defense, Space & Security and Global Services, "This is one of the world's most proven and affordable multi-role fighters. And it continues to evolve with the development of the next-generation Block III capability which will be game-changing for India." In his words, the Indian Navy will get the most advanced platform when it gets the Super Hornet Block III. It will also benefit from knowledge related to the naval aviation ecosystem that the US Navy offers and also upgrades, and tactics.

### **The F/A-18 Super Hornet is a premier frontline multi-role naval fighter.**

Financial Express Online has reported earlier that the tests last month followed eight ski-jumps in various weights and configurations which took place in 2020 at Naval Air Station (NAS) Patuxent River in Maryland. These tests had demonstrated the aircraft's ability to operate from a short takeoff but arrested recovery (STOBAR) aircraft carrier.

### **Which aircraft will the Indian Navy get for its aircraft carrier?**

No decision has been taken yet. And as has been reported in Financial Express Online earlier, the whole process of identifying the right aircraft for the navy's aircraft carrier is still a long way off.

The aircraft on offer to the Indian Navy's tender for 57 multi-role carrier-based fighters (MRCBF) — F/A-18E/F Super Hornet is being operated as the main fighter on all 11 US Navy aircraft carriers. And this aircraft is competing with Rafale Marine (M) of Dassault Aviation. The Indian navy's plan is to initially acquire 26 fighters from either the French or from the Americans and rest it is likely to go for the naval version of India's own Light Combat Aircraft (LCA). Whichever aircraft is acquired, they will project Indian Navy's power in the Indian Ocean Region where the Chinese side continues its belligerence. Recently, according to reports, the US navy and Boeing successfully demonstrated the ability of the F/A-18 Super Hornet Block III – to control three unmanned aerial vehicles (UAVs) from a manned fighter.

<https://www.financialexpress.com/defence/race-begins-fa-18-super-hornet-next-generation-block-iii-capability-will-be-game-changing-for-india-boeing/2600793/lite/>



# Business Standard

*Thu, 21 Jul 2022*

## **Boeing's F/A-18 Super Hornet Completes Operational Demonstration**

After successfully demonstrating its ability to land on, and take off from, the ski-jump that equips India's two aircraft carriers, The Boeing Company (Boeing) is confident that the aircraft it is offering — the F/A-18 Super Hornet Block III — is in pole position to win the Indian Navy's tender for initially 26, increasing to 57, multi-role carrier-based fighters (MRCBF). "Even though the Super Hornet was initially designed to operate from a catapult-launch environment, the jet is so powerful that it is able to easily achieve ski-jump launches again under its own power with heavy payloads," said Alain Garcia, Boeing's defence head in India. Challenging Boeing's Super Hornet in the MRCBF race is the naval version of the French Rafale fighter — called the Rafale Marine. However, the Rafale Marine has only a single-seat version, while the Indian Navy requires both single-seat and twin-seat variants.

A two-seat fighter offers several unique advantages, such as mission flexibility, higher fleet utilisation and the ability to carry out high workload missions that require a second crew member. Furthermore, a twin-seat fighter can also be used as a trainer. "The competitor (the Rafale Marine) does not offer a two-seat, carrier-capable platform. So the fact that we can offer a two-seat platform that is carrier capable gives a lot of flexibility from a training perspective and a mission perspective to the Indian Navy," said Garcia. In January, the Rafale Marine had undergone tests at the "shore-based test facility" (SBTF) in Goa to demonstrate its ability to operate off India's two aircraft carriers — INS Vikramaditya and INS Vikrant. Now it was the turn of the Super Hornet. During the testing in Goa, two US Navy F/A-18E/F Super Hornets completed multiple ski-jumps, roll-in and fly-in arrested landings, as well as performance flights, in a variety of weights in the air-to-air, air-to-ground, and air-to-surface configurations, meeting the Indian Navy's test requirements, Boeing announced on Wednesday.

"With the Super Hornet Block III, the Indian Navy would not only get the most advanced platform but also benefit from tactics, upgrades and knowledge related to the naval aviation ecosystem that the US Navy offers," Garcia said. Boeing announced on Wednesday that the Super Hornet tests in Goa had been preceded by internal testing in 2020 at Naval Air Station, Patuxent River, Maryland. That had included eight ski-jump take-offs, in various weights and configurations, and had demonstrated the Super Hornet's ability to operate from a "short take-off but arrested recovery" (STOBAR) aircraft carrier. The Super Hornet Block III is the US Navy's premier fighter, with over 800 aircraft delivered around the world and over 2.5 million flight hours logged. The US Navy intends to retain the Super Hornet in service till beyond 2035.

Towards this end, multi-billion-dollar investments have been made to increase the Super Hornet Block III's airframe life to 10,000 hours, from 6,000 hours in the Block II, reduce the radar cross-section, and incorporate an advanced cockpit with a large area display. Published figures reveal that the Super Hornet Block III has the lowest cost per flight hour of all the US military's fighter aircraft. It has been designed, ground up, for carrier operations and requires no modifications for operating on the deck, hangar and lifts of Indian carriers. The F/A-18 Super

Hornet Block III uses the General Electric F-414 engine, which is from the same family that powers the Tejas Mark I fighter and could go on to power its Mark 1A and Mark 2 versions. This commonality will result in efficiencies of scale, reducing the cost of engines, which amount to one-third the cost of a fighter aircraft.

[https://www.business-standard.com/article/current-affairs/boeing-s-super-hornet-fighter-jet-successfully-completes-testing-in-india-122072001314\\_1.html](https://www.business-standard.com/article/current-affairs/boeing-s-super-hornet-fighter-jet-successfully-completes-testing-in-india-122072001314_1.html)

## THE ECONOMIC TIMES

Wed, 20 Jul 2022

### **China Conducts Military Exercise with Attack Choppers Over Pangong Lake**

China's People's Liberation Army (PLA) carried out a military exercise with attack helicopters over Pangong Lake, a video telecast by the state media network CCTV shows. The 33-second video was released hours after the two countries concluded the 16th round of Corps Commander-level talks held at the Chushul-Moldo border meeting point on the Indian side of the Line of Actual Control (LAC) between India and China held on Sunday, reported Sputnik. The video shows the army aviation brigade attached to the PLA Xinjiang Military Command carrying out an exercise over the world's highest saltwater lake, Pangong Lake, at an altitude of almost 4,350 metres. China's state media reported that Z-10 attack helicopters joined the drills for the first time, unlike the past when only transport helicopters carried border defence troops for patrol missions.

Meanwhile, New Delhi and Beijing issued a joint statement on Monday, saying both sides had agreed to maintain the "security and stability" on the ground in the Western Sector along the LAC. "The two sides agreed to stay in close contact and maintain dialogue through military and diplomatic channels and work out a mutually acceptable resolution of the remaining issues at the earliest," the statement added. They said that it is likely that the Indian side could move from the friction point southeast towards the Karam Singh Hill feature while the Chinese could move north towards the point 5170 hill feature located on their side of the LAC. It is emerging that both sides could possibly see disengagement of troops from Patrolling Point 15 in the near future. Since May 2020, when the Chinese military tried to aggressively change the status quo on LAC in eastern Ladakh, both sides have been deployed opposite each other near Patrolling Point 15 which has emerged as a friction point.

India has been looking at complete disengagement of troops from the friction points and moving back troops to the pre-May, 2020 situation in the entire sector. The last disengagement of troops on the LAC took place a year ago which led to the limited resolution of the standoff at Patrol Point 17A in Gogra. Delhi and Beijing reached an agreement in February 2021 to disengage troops from the 135-km Pangong Lake, creating buffer zones until all outstanding border issues are resolved, reported Sputnik. Over 50,000 soldiers have been stationed since 2020 at forward posts along the LAC with advanced weapons to prevent a change in the status quo. The Indian Army responded strongly to the Chinese aggression in 2020 and moved multiple formations toward the Ladakh sector to bolster its preparedness. The Army has now allotted the Mathura-

based 1 Strike Corps to the northern borders while formations from all around the sector are holding their summer exercises there to keep a check on the People's Liberation Army's activities across the Line of Actual Control.

[https://m.economictimes.com/news/defence/china-conducts-military-exercise-with-attack-choppers-over-pangong-lake/amp\\_articleshow/93010489.cms](https://m.economictimes.com/news/defence/china-conducts-military-exercise-with-attack-choppers-over-pangong-lake/amp_articleshow/93010489.cms)



*Thu, 21 Jul 2022*

## **While India Falters with its Long-Drawn Out AMCA Program, South Korea's Homegrown Fighter Jet Completes First Test Flight**

South Korea's domestically developed fighter jet successfully completed its first test flight on Tuesday, a defence agency said, amid a push to replace ageing military jets in the face of nuclear and missile threats from neighbouring North Korea & China. The KF-21, also known as the 'Boramae' (Translates to Fighting Hawk), completed a 30-minute flight Tuesday from an airport in the southern city of Sacheon, South Korea's Defence Acquisition Program Administration said. The aircraft, developed by Korea Aerospace Industries, will require additional tests before planned mass production in 2026. South Korea wants to develop the next-generation aircraft as a cheaper alternative to Lockheed Martin Corp.'s F-35 Lightning II, both to supply its own military and to market overseas. Seoul, as one of the US's closest security allies, is already a buyer of F-35s.

The next-generation aircraft developed by Korea Aerospace Industries (KAI) in a project partially backed by Indonesia is designed to be a cheaper, less stealthy alternative to the U.S.-built F-35, on which South Korea relies. A prototype of the jet, dubbed KF-21, took off at 3:40 p.m. from an air force base in the south-eastern city of Sacheon, and flew for about 30 minutes, the Defence Acquisition Program Administration said in a statement. The new jet faces more testing until 2026, when mass production is set to begin. South Korea unveiled the first prototype of the KF-21 in April last year, hailing the aircraft as the future backbone of its air force and a step towards greater military independence for the U.S. ally in North Asia. In 2014, South Korea and Indonesia agreed to jointly develop the jet in a project worth 8.1 trillion won (\$6.16 billion), with Jakarta agreeing to pay a fifth of the cost.

But in 2018 Indonesia sought to renegotiate the deal, to ease pressure on its foreign exchange reserves, and later offered to pay its share in the form of a barter. The two countries agreed in November that Jakarta would keep its pledge to shoulder 20% of the development cost, including in-kind payments for a third of its share, though they have yet to formally revise the contract, an official said.

<http://www.indiandefensenews.in/2022/07/while-india-falters-with-its-long-drawn.html>



*Thu, 20 Jul 2022*

## **Strange New Phase of Matter Created in Quantum Computer Acts Like it has Two Time Dimensions**

By shining a laser pulse sequence inspired by the Fibonacci numbers at atoms inside a quantum computer, physicists have created a remarkable, never-before-seen phase of matter. The phase has the benefits of two time dimensions despite there still being only one singular flow of time, the physicists report July 20 in *Nature*. This mind-bending property offers a sought-after benefit: Information stored in the phase is far more protected against errors than with alternative setups currently used in quantum computers. As a result, the information can exist without getting garbled for much longer, an important milestone for making quantum computing viable, says study lead author Philipp Dumitrescu.

The approach's use of an "extra" time dimension "is a completely different way of thinking about phases of matter," says Dumitrescu, who worked on the project as a research fellow at the Flatiron Institute's Center for Computational Quantum Physics in New York City. "I've been working on these theory ideas for over five years, and seeing them come actually to be realized in experiments is exciting." Dumitrescu spearheaded the study's theoretical component with Andrew Potter of the University of British Columbia in Vancouver, Romain Vasseur of the University of Massachusetts, Amherst, and Ajesh Kumar of the University of Texas at Austin. The experiments were carried out on a quantum computer at Quantinuum in Broomfield, Colorado, by a team led by Brian Neyenhuis.

The workhorses of the team's quantum computer are 10 atomic ions of an element called ytterbium. Each ion is individually held and controlled by electric fields produced by an ion trap, and can be manipulated or measured using laser pulses. Each of those atomic ions serves as what scientists dub a quantum bit, or "qubit." Whereas traditional computers quantify information in bits (each representing a 0 or a 1), the qubits used by quantum computers leverage the strangeness of quantum mechanics to store even more information. Just as Schrödinger's cat is both dead and alive in its box, a qubit can be a 0, a 1 or a mashup—or "superposition"—of both. That extra information density and the way qubits interact with one another promise to allow quantum computers to tackle computational problems far beyond the reach of conventional computers.

There's a big problem, though: Just as peeking in Schrödinger's box seals the cat's fate, so does interacting with a qubit. And that interaction doesn't even have to be deliberate. "Even if you keep all the atoms under tight control, they can lose their quantumness by talking to their environment, heating up or interacting with things in ways you didn't plan," Dumitrescu says. "In practice, experimental devices have many sources of error that can degrade coherence after just a

few laser pulses." The challenge, therefore, is to make qubits more robust. To do that, physicists can use "symmetries," essentially properties that hold up to change. (A snowflake, for instance, has rotational symmetry because it looks the same when rotated by 60 degrees.) One method is adding time symmetry by blasting the atoms with rhythmic laser pulses. This approach helps, but Dumitrescu and his collaborators wondered if they could go further. So instead of just one time symmetry, they aimed to add two by using ordered but non-repeating laser pulses.



*In this quantum computer, physicists created a never-before-seen phase of matter that acts as if time has two dimensions. The phase could help protect quantum information from destruction for far longer than current methods. Credit: Quantinuum*

The best way to understand their approach is by considering something else ordered yet non-repeating: "quasicrystals." A typical crystal has a regular, repeating structure, like the hexagons in a honeycomb. A quasicrystal still has order, but its patterns never repeat. (Penrose tiling is one example of this.) Even more mind-boggling is that quasicrystals are crystals from higher dimensions projected, or squished down, into lower dimensions. Those higher dimensions can even be beyond physical space's three dimensions: A 2D Penrose tiling, for instance, is a projected slice of a 5-D lattice. For the qubits, Dumitrescu, Vasseur and Potter proposed in 2018 the creation of a quasicrystal in time rather than space. Whereas a periodic laser pulse would alternate (A, B, A, B, A, B, etc.), the researchers created a quasi-periodic laser-pulse regimen based on the Fibonacci sequence. In such a sequence, each part of the sequence is the sum of the two previous parts (A, AB, ABA, ABAAB, ABAABABA, etc.). This arrangement, just like a quasicrystal, is ordered without repeating. And, akin to a quasicrystal, it's a 2D pattern squashed into a single dimension. That dimensional flattening theoretically results in two time symmetries instead of just one: The system essentially gets a bonus symmetry from a nonexistent extra time dimension.

Actual quantum computers are incredibly complex experimental systems, though, so whether the benefits promised by the theory would endure in real-world qubits remained unproven. Using Quantinuum's quantum computer, the experientialists put the theory to the test. They pulsed laser light at the computer's qubits both periodically and using the sequence based on the Fibonacci numbers. The focus was on the qubits at either end of the 10-atom lineup; that's where the



researchers expected to see the new phase of matter experiencing two time symmetries at once. In the periodic test, the edge qubits stayed quantum for around 1.5 seconds—already an impressive length given that the qubits were interacting strongly with one another. With the quasi-periodic pattern, the qubits stayed quantum for the entire length of the experiment, about 5.5 seconds. That's because the extra time symmetry provided more protection, Dumitrescu says.

"With this quasi-periodic sequence, there's a complicated evolution that cancels out all the errors that live on the edge," he says. "Because of that, the edge stays quantum-mechanically coherent much, much longer than you'd expect." Though the findings demonstrate that the new phase of matter can act as long-term quantum information storage, the researchers still need to functionally integrate the phase with the computational side of quantum computing. "We have this direct, tantalizing application, but we need to find a way to hook it into the calculations," Dumitrescu says. "That's an open problem we're working on."

<https://phys.org/news/2022-07-strange-phase-quantum-dimensions.html>



*Thu, 21 Jul 2022*

## **Gaganyaan Abort Mission This Year; Solar, Lunar Missions in 2023**

The Indian Space Research Organisation (ISRO) has set new deadlines for major missions, with its first solar mission and third lunar mission set to take place in the first quarter of next year. The space agency's third scientific mission scheduled for next year is the space observatory, XpoSat, designed to study cosmic x-rays. The first abort demonstration for ISRO's Gaganyaan mission, however, is scheduled for later this year. Minister of State in the Space Department, Dr Jitendra Singh, wrote in an answer to Parliament on Wednesday that ISRO would also carry out a 'space docking experiment' in the third quarter of 2024.

Space docking is a process of joining two separately launched spacecraft, and is mainly used for setting up modular space stations. The Indian space agency had in 2019 announced its plans to set up its own space station in "five to seven years" after successfully launching its first human spaceflight mission. Then ISRO chairperson K Sivan had said it would be an extension of the spaceflight programme, with the space station weighing about 20 tonnes and having the capacity to house astronauts for about 15-20 days in the low earth orbit. In his answer in Parliament, the minister also said that the first milestone for the Gaganyaan mission will be undertaken in the last quarter of 2022 — it will be the first abort demonstration mission.

The abort missions are meant to test the systems that can help the crew escape from the spacecraft mid-flight in case of a failure. ISRO already conducted a pad abort test — where the crew can escape from the spacecraft in case of an emergency at the launch pad — in 2018. For the abort missions, the space agency has developed test vehicles that can send the systems up to a certain height, simulate failure, and then check the escape system. Gaganyaan's escape system



was designed with five “quick-acting” solid fuel motors with a high burn rate propulsion system, and fins to maintain stability.



*The Indian space agency had in 2019 announced its plans to set up its own space station in “five to seven years” after successfully launching its first human spaceflight mission.*

The crew escape system will separate from the crew module by firing explosive nuts. All three scientific missions slated for 2023 have been repeatedly pushed back since 2020 amidst the pandemic that slowed down all activities of the space agency, including the number of launches. There were only two launches in 2020 and 2021. This year, the space agency has already carried out two launches one carrying an Indian earth observation satellite and the second a commercial launch carrying a Singaporean earth observation satellite as the main payload.

The Aditya L1 mission will see an Indian spacecraft going 1.5 million kms away to the L1 or Lagrangian point between the Sun and Earth. There are five Lagrangian points between any two celestial bodies where the gravitational pull of both the bodies on the satellite is equal to the force required to keep the satellite in orbit without expending fuel, meaning a parking spot in space. The XpoSat will be India’s second astronomical observatory in space after the Astrosat. It will help in studying cosmic x-rays. The Chandrayaan 3 will be a lander-rover mission that aims for a soft landing on the Moon that was planned for the second lunar mission. The lander-rover will use the existing orbiter around the Moon from Chandrayaan-2 to communicate with Earth. The orbiter has been calculated to have a mission life of seven years and was launched in 2019.

<https://indianexpress.com/article/technology/science/gaganyaan-abort-mission-this-yr-solar-lunar-missions-in-2023-8042227/lite/>



*Thu, 20 Jul 2022*

## **For the First Time Ever, Images of Brain Inflammation have been Successfully Captured**

Using diffusion-weighted magnetic resonance, researchers captured pictures of the activation of microglia and astrocytes, two kinds of cells involved in neuroinflammation. The labs of Dr. Silvia de Santis and Dr. Santiago Canals from the Institute of Neurosciences UMH-CSIC (Alicante, Spain) have used diffusion-weighted magnetic resonance imaging to image brain inflammation not only for the first time but also in great detail. Data gathering sequences and specialized mathematical models are needed to produce this in-depth “X-ray” of inflammation, which cannot be done with a standard MRI. After developing the technique, the researchers were able to measure the changes in the morphology of the various cell populations contributing to the inflammatory process in the brain. This significant discovery, which was recently published in the journal *Science Advances* and may be essential to altering the trajectory of research and treatment of neurodegenerative diseases, was made possible by an innovative strategy created by the researchers.

The study, whose first author is Raquel Garcia-Hernández, shows that diffusion-weighted MRI can noninvasively and differentially detect the activation of microglia and astrocytes, two kinds of brain cells that are at the source of neuroinflammation and its development. Degenerative brain conditions including Parkinson’s, multiple sclerosis, Alzheimer’s, and other dementias are critical and challenging issues to solve. One of the causes of neurodegeneration and a factor in its progression is chronic inflammation in the brain, which is brought on by the sustained activation of two kinds of brain cells, microglia and astrocytes. However, there is a lack of non-invasive approaches capable of specifically characterizing brain inflammation *in vivo*. The current gold standard is positron emission tomography (PET), but it is difficult to generalize and is associated with exposure to ionizing radiation, so its use is limited in vulnerable populations and in longitudinal studies, which require the use of PET repeatedly over a period of years, as is the case in neurodegenerative diseases.

Another drawback of PET is its low spatial resolution, which makes it unsuitable for imaging small structures, with the added drawback that inflammation-specific radiotracers are expressed in multiple cell types (microglia, astrocytes, and endothelium), making it impossible to differentiate between them. In the face of these drawbacks, diffusion-weighted MRI has the unique ability to image brain microstructure *in vivo* noninvasively and with high resolution by capturing the random movement of water molecules in the brain parenchyma to generate contrast in MRI images.

### **Using an innovative strategy**

In this study, researchers from the UMH-CSIC Neurosciences Institute have developed an innovative strategy that allows imaging of microglial and astrocyte activation in the gray matter of the brain using diffusion-weighted magnetic resonance imaging (dw-MRI). “This is the first

time it has been shown that the signal from this type of MRI (dw-MRI) can detect microglial and astrocyte activation, with specific footprints for each cell population. This strategy we have used reflects the morphological changes validated post-mortem by quantitative immunohistochemistry,” the researchers note. They have also shown that this technique is sensitive and specific for detecting inflammation with and without neurodegeneration so that both conditions can be differentiated. In addition, it makes it possible to discriminate between inflammation and demyelination characteristics of multiple sclerosis.

This work has also been able to demonstrate the translational value of the approach used in a cohort of healthy humans at high resolution, “in which we performed a reproducibility analysis. The significant association with known microglia density patterns in the human brain supports the usefulness of the method for generating reliable glia biomarkers. We believe that characterizing, using this technique, relevant aspects of tissue microstructure during inflammation, noninvasively and longitudinally, can have a tremendous impact on our understanding of the pathophysiology of many brain conditions and can transform current diagnostic practice and treatment monitoring strategies for neurodegenerative diseases,” highlights Silvia de Santis.

To validate the model, the researchers have used an established paradigm of inflammation in rats based on intracerebral administration of lipopolysaccharide (LPS). In this paradigm, neuronal viability and morphology are preserved, while inducing, first, activation of microglia (the brain’s immune system cells), and in a delayed manner, an astrocyte response. This temporal sequence of cellular events allows glial responses to be transiently dissociated from neuronal degeneration and the signature of reactive microglia investigated independently of astrogliosis.

To isolate the imprint of astrocyte activation, the researchers repeated the experiment by pretreating the animals with an inhibitor that temporarily ablates about 90% of microglia. Subsequently using an established paradigm of neuronal damage, they tested whether the model was able to unravel neuroinflammatory “footprints” with and without concomitant neurodegeneration. “This is critical to demonstrate the utility of our approach as a platform for the discovery of biomarkers of inflammatory status in neurodegenerative diseases, where both glia activation and neuronal damage are key players,” they clarify. Finally, the researchers used an established paradigm of demyelination, based on focal administration of lysolecithin, to demonstrate that the biomarkers developed do not reflect the tissue alterations frequently found in brain disorders.

<https://scitechdaily.com/for-the-first-time-ever-images-of-brain-inflammation-have-been-successfully-captured/amp/>

