

Feb
2021

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खंड : 46 अंक : 23 02 फरवरी 2021

Vol.: 46 Issue : 23 02 February 2021



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Tue, 02 Feb 2021

Defence Minister to inaugurate HAL's second LCA production line

Rajnath Singh will inaugurate Hindustan Aeronautics Limited's Tejas Light Combat Aircraft's second production line on Tuesday

Bengaluru: Defence Minister Rajnath Singh will inaugurate Hindustan Aeronautics Limited's Tejas Light Combat Aircraft's second production line on Tuesday, according to HAL officials. The event comes a day before the opening of the Aero India 2021, the country's premier aerospace and Defence exhibition at Air Force Station, Yelahanka on Wednesday.

The delivery of the Tejas LCA to the Indian Air Force under a ₹ 48,000-crore deal will begin from March 2024 and around 16 aircraft will be rolled out annually till the completion of the total supply of 83 jets, Chairman and Managing Director of Hindustan Aeronautics Limited, R Madhavan said recently.

Mr Madhavan had also said that a number of countries have shown keen interest in procurement of the Tejas aircraft and that the first export order is likely to come by in the next couple of years.

The Cabinet Committee on Security (CCS) chaired by Prime Minister Narendra Modi on January 13 had approved the deal to procure 73 Tejas Mk-1A variants and ten LCA Tejas Mk-1 trainer aircraft from the HAL to boost the Indian Air Force's combat prowess.

<https://www.ndtv.com/india-news/defence-minister-rajnath-singh-to-inaugurate-hals-second-lca-production-line-on-tuesday-2361083>



Defence Minister Rajnath Singh To Inaugurate HAL's Second LCA Production Line On Tuesday

Union Budget 2021 | 18.75% hike in capital outlay for Defence

Forces got additional ₹20,776 cr last year amid Ladakh standoff

By Dinakar Peri

New Delhi: In the backdrop of the ongoing standoff with China and impetus for military modernisation, the allocation for capital expenditure in the Defence Budget saw an increase of ₹21,326 crore or 18.75% compared to Budget Estimates (BE) of last year.

Budget data also shows that the armed forces got an additional allocation of ₹20,776 crore under capital expenditure last year for emergency procurements in the face of massive mobilisation along the Line of Actual Control (LAC).

The total allocation for defence in the Union budget at ₹4.78 lakh crore including defence pensions, is a marginal hike compared to ₹4.71 lakh crore last year, an increase of 1.48%.

Dip in pensions

The allocation for 2021-22 stands at ₹3.62 lakh crore excluding defence pensions which stood at ₹1.16 lakh crore. Excluding defence pensions, the hike is about 7.34%, up from 3.37 lakh crore to 3.62 lakh crore. However, data shows that defence pensions have gone down significantly from the Budget Estimates of last year.

The capital allocation in BE last year at ₹1.13 lakh crore went up to ₹1.35 lakh crore in the BE this year, an increase of ₹21,326 crore. Referring to the almost 18.5% increase, a Defence Ministry statement said. "This is the highest ever increase in capital outlay for defence in the last 15 years."

The defence pensions saw a significant dip from ₹1.34 lakh crore in Budget Estimate last year to ₹1.25 lakh crore in Revised Estimates and further to ₹1.15 lakh crore allocated this year. From BE 2020-21 to BE 2021-22 this represents a decrease of ₹17,775 crore or about 13.4%.

The capital allocation in BE last year was ₹1.13 lakh crore which went up to ₹1.35 lakh crore in the BE this year.

Budget data shows that last year the armed forces got an additional allocation of ₹20,776 crore under capital expenditure in the Revised Estimates, largely to cater to emergency procurements due to the LAC standoff.

As the standoff in May last year, the Army deployed 50,000 troops and equipment along the LAC in Eastern Ladakh. The Indian Air Force (IAF) too forward deployed its frontline fighters. The services also went in for a series of emergency procurements including equipment and extreme weather clothing for the troops deployed in the high altitude areas in the peak winter.

Emergency allocations

Last month, Army Chief Gen. Manoj Naravane had said last year 38 deals were made through 'emergency and fast track' route worth about ₹5,000 crore and in addition capital procurements



File photo for representation. | Photo Credit: Shiv Kumar Pushpakar

worth ₹13,000 crore were also concluded. The procurements included light machine guns, light special vehicles and protective gear for infantry, infantry combat vehicles for mechanised infantry and long range vectors for artillery and also equipment for Engineers and Signals regiments.

On the decrease in defence pensions, a Defence official said, “Last year it was more because approximately ₹18,000 crore was to be paid on account of pension arrears. Also salary and pension are based on actuals.”

The capital allocation for DRDO has been increased to ₹11,375.50 crore, an increase of 8% over 2020-21, the Ministry said. The allocation for Border Roads Organisation (BRO) has been increased to ₹6004.08 crore which is 7.48% increase over 2021-22.

The 15th Finance Commission observed in its report that the expenditure on defence services as a proportion of GDP declined from 2% in 2011-12 to 1.5% in 2018-19 and to 1.4% in BE 2020-21.

Between 2011-12 and 2018-19, defence revenue expenditure grew faster, 10%, than the increase in defence capital outlay, 4.7%, and resulted in a reduction of the share of defence capital outlay in total defence services expenditure (excluding defence pension) from 40% in 2011-12 to 33% in 2018-19, the main report observed.

<https://www.thehindu.com/business/budget/union-budget-478-lakh-crore-allocated-for-defence/article33716866.ece>

Business Standard

Tue, 02 Feb 2021

Defence allocation remains same, IAF gets highest capital boost in Budget

Budget allocations for 2021-22 are skewed, with the IAF allocated Rs 53,215 crore, the Navy Rs 35,904 crore, and the Army getting Rs 36,532 crore

By Ajai Shukla

New Delhi: In a situation of heavy pressure on the economy, while also confronting an intrusion by Chinese troops on the border in Ladakh, the government has kept the defence budget at approximately the same level as the current year, allocating Rs 4.78 trillion for 2021-22.

The revised estimates for 2020-21 indicate that the military has spent Rs 4.84 trillion this year, a significantly higher amount than what was allocated in February 2020.

The reason for this is learnt to be the emergency procurement of arms and ammunition that was triggered by the Chinese intrusions into Ladakh last April. Against Rs 1.18 trillion allocated for capital spending in the current year, the government spent Rs 1.37 trillion – almost Rs 20,000 crore extra.

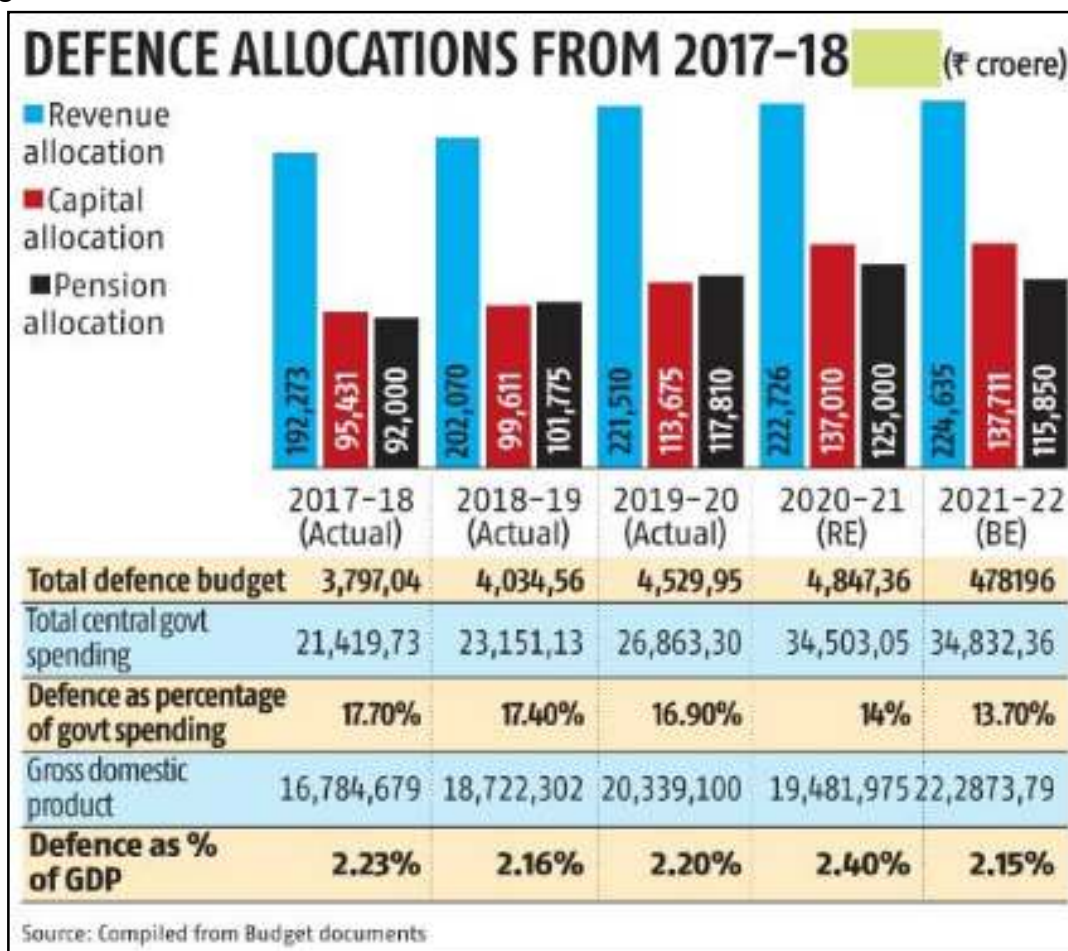
Much of the money for the extra capital spending was found by squeezing the pension budget. Of the Rs 1.33 trillion allocated for defence pensions, the government spent only Rs 1.25 trillion. For the coming year, the government has slashed defence pension allocations by another Rs 9,000 crore.



Defence experts, many of whom have lamented the large share of the defence budget consumed by pensions, say the reduction is being made possible by the plan to increase the retirement age of soldiers, sailors and airmen. This has been proposed by Chief of Defence Staff General Bipin Rawat.

Expenditure in the current year's capital budget is biased heavily in favour of the Indian Air Force (IAF), which has spent Rs 55,084 crore, compared to the Navy's Rs 40,043 crore and Army's Rs 33,283 crore.

The Army has the smallest share in the capital budget, even though it is facing the brunt of Chinese intrusions in Ladakh and has undertaken a challenging winter deployment in the 15,000-ft-plus heights there.



The capital budget allocations for the coming year, 2021-22, are similarly skewed, with the IAF allocated Rs 53,215 crore, the Navy Rs 35,904 crore and the Army getting Rs 36,532 crore.

This underlines the IAF's continuing burden of payments for the Rafale fighters it bought in 2016, modernisation of the Mirage 2000 fighter fleet and manufacture of additional Sukhoi-30MKIs and Tejas fighters by Hindustan Aeronautics (HAL).

There is also a large expenditure looming on a tender for 114 multi-role fighters, for which the IAF has initiated global procurement.

To the military's credit, it has mobilised a large number of troops and equipment to the Ladakh frontier without overshooting its revenue budget, from which payments for such a deployment is made.

Against the revenue budget allocation of Rs 2.19 trillion for the current year, the military has spent Rs 2.22 trillion on its operations countrywide, including in Ladakh.

https://www.business-standard.com/budget/article/defence-allocation-remains-same-iaf-gets-highest-capital-boost-in-budget-121020102022_1.html

Defence Budget: Only 0.4% hike in capital expenditure as armed forces overshot last budget by Rs 23,000 crore

The new defence budget only provides for 0.4% hike in capital expenditure in the defence budget as the Indian Armed forces had overshot their budget for capital expenditures by Rs 23,000 crore, last year

By Abhishek Bhalla

New Delhi: The capital expenditure in the defence budget has been effectively increased by meagre 0.4 per cent as compared to last year's spending, instead of said 19 per cent, as the armed forces spent Rs 23,000 crore over and above the original budget allocation of 2020-21.

The total allocation for defence in 2021-22, including pensions, is Rs 4.78 lakh crore compared to Rs 4.71 lakh crore, last year. Without pension allocation, it is Rs 3.62 lakh crore in comparison to last year's Rs. 3.37 lakh crore.

The capital expenditure fund, which is meant to procure big-ticket weapons, fighter jets, submarines, helicopters and other modern military systems, has been increased from Rs 1,13,734 crore last year to Rs 1,35,060 crore - a near 19 per cent hike. However, during the Ladakh standoff with China, a lot of emergency purchases were made. This revised the last year's actual capital expenditure to Rs. 1,34,510 crore. So, effectively there is a very marginal increase in capital outlay meant for procuring new equipment.



The government has allocated Rs 1.35 lakh crore for capital expenditure on defence for FY 2021-22 | File photo from Getty Images

Revised expenses amid China aggression

While it was the Indian Army holding fort at the Ladakh borders during the tensions that started last year in May, the jump in revised expenditures for 2020-21 of the Navy and Air Force was much more.

Last year, the Indian Air Force's original allocation was overshot by Rs 11,773 crore and the Navy spent Rs 10,854 crore over their budget. In comparison, the Army spent Rs 821 crore above its allocation.

The Indian Navy spent nearly Rs 5000 crore extra on its fleet, the budget papers show. The Air Force had to enhance its expenditure to procure several equipment and special projects, the budget papers say.

The defence ministry also carried out extensive construction work on borders last year, following the India-China standoff.

While the estimated budget for the civil work was Rs 14,500 crore, it increased to Rs 15,914.06 crore as the government spent on building infrastructure in border areas.

In this year's budget, the capital outlay for the Indian Army is Rs 36,481 crore, for Air Force it is Rs 53,214 crore and for the Navy, it's Rs 33,253 crore.

Defence Minister Rajnath Singh said, "I specially thank Prime Minister Finance Minister for increasing the defence budget to 4.78 lakh cr for FY21-22 which includes capital expenditure worth Rs 1.35 lakh crore. It is nearly 19 per cent increase in defence capital expenditure. This is the highest -ever increase in capital outlay for defence in 15 years."

Other expenses

The allocation of pension for defence personnel in the latest budget is Rs 1.15 lakh crore as against revised allocation Rs 1.25 lakh crore, last year.

This is because, last year, approximately Rs 18,000 crore pension arrears were to be paid, officials said.

Apart from that, the allocation for civil works under the Ministry of Defence is Rs 15,257 crore as against revised allocation Rs 15,914.06 crore in last year's budget. The civil allocation includes allocation for construction of roads, bridges, government aid to state governments and housing in North East regions and border areas.

Non-lapsable funds for defence

The Finance Commission's proposal of a non-lapsable fund for the defence sector has been accepted in principle but the modalities need to be worked out.

Finance Minister Nirmala Sitharaman said, "In principle, we have accepted that but what formulation that will take will be different. That is something the ministry will have to work out."

India Today TV had reported earlier that the Ministry of Defence had proposed a roll-on non-lapsable budget over a period of five years for big-ticket acquisitions.

It is proposed that a fund of Rs 2.38 lakh crore will be available for a period of five years 2021-26 that will not lapse.

The fund can be used for modernisation of forces, capital investment for central armed police forces and also state police forces.

<https://www.indiatoday.in/business/budget-2021/story/defence-budget-only-0-4-hike-in-capital-expenditure-as-armed-forces-overshot-last-budget-by-rs-23-000-crore-1764937-2021-02-01>

THE TIMES OF INDIA

Tue, 02 Feb 2021

Lt General Chandi Prasad Mohanty takes charge as Vice Chief of Army Staff

Budget allocations for 2021-22 are skewed, with the IAF allocated Rs 53,215 crore, the Navy Rs 35,904 crore, and the Army getting Rs 36,532 crore

By Ajai Shukla

New Delhi: Lt General Chandi Prasad Mohanty on Monday took charge as the Vice Chief of the Army Staff, succeeding Lt General SK Saini.

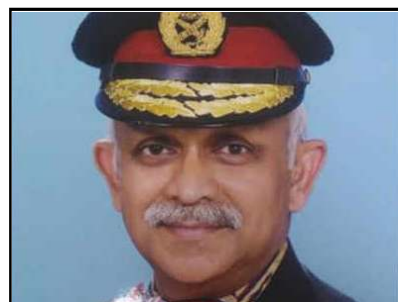
In a career spanning four decades, the officer served in numerous positions in field and highly active counter-insurgency environments.

Lt General Mohanty was heading the Army's Southern Command when he was appointed as Vice Chief of the Army Staff. General Saini retired from service on Sunday.

An alumnus of the Indian Military College, Dehradun and National Defence Academy, Khadakwasla, Lt General CP Mohanty was commissioned into the Rajput Regiment on June 12, 1982.

He has the unique distinction of commanding two brigades - first on the Line of Actual Control and at the multinational UN Brigade in Democratic Republic of Congo.

He later commanded the Rangiya-based division in a counter insurgency environment and the Sikkim-based Trishakti Corps immediately after the Doklam incident.



Lt General Chandi Prasad Mohanty

"The General officer also has a unique distinction of commanding two administrative formations as well: the Jodhpur Sub Area as a Major General and Uttar Bharat Area as a Lt General," an official release said.

Lt General Mohanty's staff and instructional assignments include a tenure at NDA, Brigade Major of an armoured brigade, military advisor in Seychelles, Brigadier General Staff (Operations) of a Corps in the Eastern theatre and director General, Operational Logistics and Strategic Movement.

<https://timesofindia.indiatimes.com/india/lt-general-chandi-prasad-mohanty-takes-charge-as-vice-chief-of-army-staff/articleshow/80629730.cms>



Tue, 02 Feb 2021

Lt Gen JS Nain takes charge as GOC-in-C of Army's Southern Command

Lt Gen Nain is an alumnus of Sainik School, Kunjpura, and National Defence Academy, Khadakwasla. He was commissioned into the Dogra Regiment in June 1983, of which he is also Colonel of the Regiment

Pune: Lieutenant General JS Nain took charge of the Southern Army Command as General-Officer-Commanding-in-Chief on Monday with a wreath laying ceremony at National War Memorial in Pune. It was followed by a traditional Guard of Honour at Southern Command headquarters.

Lt Gen Nain is an alumnus of Sainik School, Kunjpura, and National Defence Academy, Khadakwasla. He was commissioned into the Dogra Regiment in June 1983, of which he is also Colonel of the Regiment.

He has comprehensive operational experience through varied command and staff appointments during his military career. He has commanded his battalion in Jammu and Kashmir on the Line of Control (LoC) and in a strike corps of Southern Command, a mountain brigade in the Northeast, an infantry division responsible for dominating the LoC in North Kashmir and a strategically important corps on the western front.

He was an instructor at Infantry School and a military observer at the United Nations mission in Iraq and Kuwait. He has held staff appointments in an independent mechanised brigade, counter-insurgency force, the military secretary's branch at Integrated Headquarters of Ministry of Defence (Army), South Western Command headquarters and as Chief of Staff of two operationally active commands — Northern and Eastern.

He has done extensive research on Jammu and Kashmir, Pakistan, China and Bangladesh, making him a domain expert on these regions. He is a graduate of Defence Services Staff College, Wellington, College of Defence Management, Secunderabad, and National Defence College in Bangladesh.

Lt Gen Nain and his wife, Anita, who is also the regional president of Army Wives Welfare Association, were accorded a welcome by military officials at Pune.

<https://indianexpress.com/article/india/lt-gen-js-nain-takes-charge-as-goc-in-c-of-armys-southern-command-7170467/>

How India's new warrior drone can help reshape air combat

The drone, called Warrior, is part of an indigenous programme called CATS or Combat Air Teaming System, described as "a composite amalgamation of manned and unmanned platforms which work together to penetrate heavily defended enemy airspace."

By Vishnu Som

Highlights

- *The drone, called Warrior, is part of indigenous programme called CATS*
- *The first Warrior prototypes are expected to fly within 3-5 years*
- *It's being designed to operate with Indian-made Tejas combat aircraft*

New Delhi: A full scale replica of India's first-ever semi-stealth drone, now under development, is being showcased at Aero India, the mega air-show which kicks off in Bengaluru later this week.

The drone, called Warrior, is part of an indigenous programme called CATS or Combat Air Teaming System, described as "a composite amalgamation of manned and unmanned platforms which work together to penetrate heavily defended enemy airspace." In simple terms, the Warrior drone is being designed to operate with an Indian-made Tejas combat aircraft flown by an Indian Air Force pilot, which it will defend and fight with as they go into combat together.



An animated image of 2 unmanned Warrior drones flying in support of a Tejas Light Combat Aircraft.

The first Warrior prototypes are expected to fly within three to five years and is being funded by Hindustan Aeronautics (HAL).

"Multiple Warriors will be commanded by a single Tejas," said a source close to the project. The idea is to maximise the effectiveness of every mission while reducing the potential of losing the lives of precious pilots since they would be accompanied by the drones which would protect them. "The Warrior is being armed with air-to-air and air-to-ground missiles," which would be used to hit targets on the ground or in the air.

The Warrior, while not an out-and-out stealth platform, which would allow it to evade being picked up by radar, is classified 'low observable', which makes its detection challenging for contemporary systems.

At the moment, Hindustan Aeronautics Limited, which has been working on drone warfare concepts for more than five years, is working towards the design, development and integration of key subsystems of Warrior. The Indian Air Force and the Indian Navy, the eventual users of the platform, will need to re-shape their operational philosophies around the concept of 'combat-teaming' to effectively integrate the use of a manned and unmanned platform.



The Warrior unmanned drone is part of CATS, or Combat Air Teaming System, which has multiple next-generation systems under development.

The Hunter drone is a part of a series of new designs which are in the process of being designed and developed. This includes the Hunter cruise missile, designed to hit targets more than 200 kilometres away and a swarm drone system called ALFA-S designed to hone in on multiple targets which it identifies through artificial intelligence and machine-learning technology which allows the weapon to discriminate between possible targets.

Being designed with HAL by Newspace Research and Technologies, a Bengaluru-based start-up, the ALFA-S may not have any parallel around the world. The drones are housed on a unique carrier, mounted on a Jaguar fighter bomber. The carrier separates from the Jaguar, glides for approximately 100-plus kilometers before releasing the propeller-powered swarm drones which engage their targets. "The ALFA-S drones are programmed with algorithms to seek and destroy enemy surface to air missiles, aircraft on the ground and other ground targets. The unique nature of the platform gives it an export potential for friendly nations," the source said.

With the showcasing of the CATS program at Aero India 2021, HAL has committed to and embarked on the Next Generation product development effort to cater to the future warfare needs of the Indian Armed Force.

<https://www.ndtv.com/india-news/exclusive-how-indias-new-warrior-drone-can-help-reshape-air-combat-2361475>

The Tribune

Tue, 02 Feb 2021

CSIR develops three mob control vehicles for paramilitary forces

MCVs designed and fabricated by Central Mechanical Engineering Research Institute, which had brought in indigenous tractor revolution in India

By Vijay Mohan

Chandigarh: To provide modern technical support to paramilitary forces deployed in maintaining law and order and internal security operations, the Council for Scientific and Industrial Research (CSIR) has developed three innovative mob control vehicles (MCV).

The MCVs, categorised as compact, medium and heavy category, are claimed to be the first-of-its-kind advanced indigenous design and featured development programme in the country.

The MCVs have been designed and fabricated by CSIR's Central Mechanical Engineering Research Institute, which had earlier brought in indigenous tractor revolution in India.



A heavy category MCV.

The heavy category MCV prototype has a 7.5-ton payload capacity, while, the medium category has a 2.5-ton payload capacity. The compact one is a tractor-based vehicle for easy maneuvering. The key requirements and technical specifications for these vehicles have been evolved and formulated with the involvement of various stakeholders.

The prototypes consist of several independent operational sub-systems. These include height adjustable front shovel, retractable protective front shield, all round irritant spray system, foam spray system and tear smoke munitions system.

Other capabilities are a cabin pressurisation system, retractable multi-barrel tear gas launcher with appropriate electronic vision systems, wide angle surveillance, multi-channel video transmission system, GPS tracker and GPS navigator.

The design architecture allows easy and fast customization in downstream products. The production versions of the MCVs can be tailor-made as per the specific requirements and functional priorities of different users so that their effectiveness in mob or riot control scenario can be augmented.

These were demonstrated to a team from the Ministry of Home Affairs lead by an officer of the rank of Inspector General from the Central Reserve Police Force. Senior officers from the National

Security Guard, Border Security Force, Assam Rifles, Central Industrial Security Force, Indo-Tibetan Border Police Force and some state police forces were also present on the occasion.

[https://www.tribuneindia.com/news/nation/csir-develops-three-mob-control-vehicles-for-paramilitary-forces-206412#:~:text=A%20heavy%20category%20MCV.&text=To%20provide%20modern%20technical%20support.mob%20control%20vehicles%20\(MCV\).](https://www.tribuneindia.com/news/nation/csir-develops-three-mob-control-vehicles-for-paramilitary-forces-206412#:~:text=A%20heavy%20category%20MCV.&text=To%20provide%20modern%20technical%20support.mob%20control%20vehicles%20(MCV).)

THE TIMES OF INDIA

Tue, 02 Feb 2021

India, US start discussions on F-15EX multi-role combat aircraft: Boeing

Washington: The US and India have held discussions on F-15EX fighter jets and the two respective air forces have exchanged information about it, a top Boeing official has said after the aerospace major received approval from the American government to offer its latest multi-role combat aircraft to the Indian Air Force.

The F-15EX is the latest and most advanced version of the multi-role, allweather, and day and night versions of the F-15 aircraft family.

"There have been discussions between the two governments and the two Air Forces have exchanged information about the F-15EX," Maria H Laine, vice president, Boeing International Sales and Industrial Partnerships told PTI in a joint interview with Jeff Shockey, vice president, Global Sales and Marketing, Boeing Defense, Space & Security and Boeing Global Services.

"Since the US Government approved our license request to offer F-15EX to India, we are starting to have more discussions about the platform," Laine said.

The US Air Force awarded Boeing an indefinite-delivery/indefinite-quantity contract with a ceiling value of nearly USD 23 billion in July 2020, she added.

"It certainly sends a powerful signal when the US government makes a commitment to a platform like this that they're in it or the long haul and are showing faith and confidence in the capability and price point of the F-15EX— piques interest in the US and around the world," Shockey said.

In April 2019, the IAF issued an RFI (request for information) or initial tender to acquire 114 jets at a cost of around USD 18 billion, which is billed as one of the world's biggest military procurements in recent years.

The top contenders for the deal include Lockheed's F-21, Dassault Aviation's Rafale, the Eurofighter Typhoon, Russian aircraft MiG 35 and Saab's Gripen. Boeing said the F-15EX will be exhibited at the Aero India 2021 in Bengaluru beginning next week.

Responding to a question, Laine said the Block III Super Hornet for the Indian Navy is the newest, highly capable, affordable and available attack fighter on offer to India.

"We look forward to responding to the RFP (request for proposal) when it is released later this year," she said.

Headed to India to attend the Aero India show in Bengaluru this week, she argued that F/A-18 Super Hornet recently demonstrated its compatibility with Indian Navy carriers by successfully concluding the ski-jump test programme.

An F/A-18 Super Hornet selection offers several advantages to India, she said.



With the Super Hornet being the frontline fighter for the US Navy, cooperation between the two navies in naval aviation can unlock the potential of cooperation in naval aviation, with the sharing of best practices in modern naval aviation systems, carrier integration know-how, services and training and weapon systems, she added.

The F/A-18 can act as force multipliers for the Indian Navy as it can interface with assets such as P-8I. In addition, with both one-seat and two-seat variants, Super Hornet is capable of performing all missions from the carrier, including training,” Laine said.

The F/A-18 Super Hornet has the lowest operation and support cost of any tactical aircraft in the US, including single-engine fighters, she said.

The US Navy operates more than 600 Super Hornets and Growlers. Multi-billion dollar investments that have gone in infusing new technologies in the aircraft by the US Navy and several international customers.

“.....given the current economic environment, customers can benefit from its affordable acquisition cost and cost of operations. The Super Hornet costs less per flight hour to operate than any other tactical aircraft in the US forces inventory, including single-engine fighters, because of its durability and ease of maintenance,” Laine said.

<https://timesofindia.indiatimes.com/india/india-us-start-discussions-on-f-15ex-multi-role-combat-aircraft-boeing/articleshow/80627721.cms>



Tue, 02 Feb 2021

First Indo-US combat drill of Biden era in Rajasthan next week

India and the US are all set to kick off a major combat exercise in Rajasthan next week, in the first such bilateral wargames after the Biden administration took charge in Washington and reiterated India’s role as a key partner in the Indo-Pacific as well as the need to strengthen the “Quad”.

Indian officials say the ‘Yudh Abhyas’ exercise, which will be held at the Mahajan Field Firing ranges from February 8 to 21, will once again underscore the continuing upward trajectory in defence cooperation with the US, which enjoys bipartisan support among the Democrats and Republicans.

The US contingent for Yudh Abhyas will include a brigade headquarters and a battalion group of around 250 soldiers from a Stryker Brigade Combat Team. India will also field an infantry brigade headquarters and a battalion group from the Jammu and Kashmir Light Infantry for the exercise.

“The aim is to further enhance interoperability in counter-terrorist operations in a semi-urban, semi-desert terrain, along with attack helicopters and infantry combat vehicles,” said an officer.

Yudh Abhyas, which comes after India conducted the 24th edition of the top-notch ‘Malabar’ naval exercise with the other Quad countries (US, Japan and Australia) in November, will be followed by the ‘Vajra Prahar’ land combat exercise in March.

The Malabar, of course, sent a strong strategic signal to China amidst the continuing military confrontation in eastern Ladakh, with the Quad nations stressing their commitment to “support a free, open, inclusive Indo-Pacific as well as a rules-based international order”.

India, incidentally, also deployed a long-range Poseidon-8I maritime patrol aircraft and other personnel for the ‘Sea Dragon’ anti-submarine warfare exercise with the US, Japan, Australia and Canada from January 14 to 27 in Guam. The aim, interestingly, was to strengthen interoperability among partner nations for “regional contingencies”.

The new US secretary of state Antony J Blinken, secretary of defence Lloyd J Austin and national security adviser Jake Sullivan, in their talks with their Indian counterparts and elsewhere last week, have all conveyed their intention to carry forward the Indo-Pacific strategy of the previous Trump administration.

“The Biden administration’s overall policy towards China will, of course, be more nuanced. But defence cooperation between India and the US will continue to be the main driver of the bilateral strategic partnership,” said an official.

India has inked four “foundational military pacts” with the US, with the Basic Exchange and Cooperation Agreement for Geospatial Cooperation (BECA) being concluded last year.

Beginning with the General Security of Military Information Agreement (GSOMIA) in 2002, the Logistics Exchange Memorandum of Agreement (LEMOA) was inked in 2016, and the Communications, Compatibility and Security Arrangement (COMCASA) in 2018.

The US has also bagged lucrative Indian defence deals worth over \$21 billion just since 2007, with latest ones for 24 MH-60 ‘Romeo’ multirole naval helicopters and six more Apache attack choppers for \$3 billion being inked during former President Donald Trump’s visit here in February last year, as was reported by TOI.

<https://www.defencenews.in/article/First-Indo-US-combat-drill-of-Biden-era-in-Rajasthan-next-week-1033647>

Science & Technology News



Tue, 02 Feb 2021

Budget 2021: First unmanned launch of space flight 'Gaganyaan' slated for December 2021, says FM Nirmala Sitharaman

Finance Minister Nirmala Sitharaman on Monday commenced presentation of the Budget for 2021-22 in the Lok Sabha

In announcing the allocation for the Space Department under the Union Budget 2021-22, the Finance Minister said that the first unmanned launch of the space flight mission 'Gaganyaan' has been planned for December, 2021.

For the uninitiated, Gaganyaan (literally, "Sky Craft") is an Indian crewed orbital spacecraft intended to be the formative spacecraft of the Indian Human Spaceflight Programme.

The spacecraft is being designed to carry three people, and a planned upgraded version will be equipped with rendezvous and docking capability.

Sitharaman today said that four Indian astronauts have been trained in Russia for the Gaganyaan space mission.

It was earlier announced that the crewed vehicle has been delayed to no earlier than 2022, due to the adverse impact from the COVID-19 pandemic, according to Indian Space Research Organisation (ISRO) officials.



Representational Image

The Finance Minister has now announced that India is looking at the target of December, 2021 for an unmanned launch of the 'Gaganyaan'.

New Space India Ltd is also slated to execute the PSLV-C51, the 53rd mission of the Indian Polar Satellite Launch Vehicle (PSLV) programme, launch.

Meanwhile, a financial outlay of Rs 4000 crore has also been detailed in the Union Budget for deep ocean survey from space.

The PSLV C51 rocket will carry primary payload, Amazônia-1 and secondary payloads like Anand, SatishSat and UnitySat.

The Gaganyaan project has the objective of demonstrating human space flight capability to Low Earth Orbit (LEO) with three crew members in orbit and safely recovering them after the mission.

Bengaluru-headquartered ISRO had said that its heavy lift launcher, GSLV MkIII is identified for the Gaganyaan mission and the process for human rating of this rocket is in progress.

<https://www.freepressjournal.in/india/budget-2021-first-unmanned-launch-of-space-flight-gaganyaan-slated-for-december-2021-says-fm-nirmala-sitharaman>



Tue, 02 Feb 2021

Deep Ocean Mission: Rs 4,000 crore allocated to help India strengthen links with its oceans

Union Finance Minister Nirmala Sitharaman announced an allocation of over Rs 4,000 crore over the next five years for the Deep Ocean Mission. This is in addition to the Rs 1,897 crore allocated for the ministry in the current financial year

By Anjali Marar

Pune: India has embarked on a major mission aimed at improving understanding about oceans, its biodiversity and impact of climate change, along with development and demonstration of technology to undertake future ocean explorations.

On Monday, Union Finance Minister Nirmala Sitharaman announced an allocation of over Rs 4,000 crore over the next five years for the Deep Ocean Mission. This is in addition to the Rs 1,897 crore allocated for the ministry in the current financial year.

“Our oceans are a storehouse of living and non-living resources. This Mission will cover deep ocean survey exploration and projects for the conservation of deep sea bio-diversity,” said Sitharaman.

This inter-ministerial and inter-departmental mission, planned over the next five years, will see collaboration of researchers and experts from institutions operating under the Ministry of Earth Sciences (MoES), Indian Space Research Organisation (ISRO), Defence Development and Research Organisation (DRDO), Department of Atomic Energy (DAE), Council of Scientific and Industrial Research (CSIR), Department of Biotechnology (DBT) and the Indian Navy.

Speaking to The Indian Express on Monday on the importance of the mission, M Rajeevan, secretary of MoES, said, “We do not know much about our oceans. We hardly have knowledge of about 5 per cent of the explored deep oceans. There are several unexplored areas, including biodiversity, and our work under this mission will concentrate on the Indian Ocean region.”

Flanked by the Bay of Bengal, the Arabian Sea and the Indian Ocean on its three sides, India has a vast coastline measuring over 7,517 km, with nine coastal states and 1,382 islands dependent on the seas. As much as 95 per cent of India’s trade is handled via these seas.



The Deep Ocean Mission, which is part of the Blue Economy envisioned to be developed by 2030, will place India among select countries — US, France, Japan, Russia and China — to have special missions dedicated for ocean studies.

The launch of this mission is being seen as a strategic and geo-political move in order to further strengthen India's position in the Indian Ocean region. Several learnings from this mission, experts share, will unearth vital information from the deep ocean and have a number of applications in areas including marine biodiversity, minerals, effects of climate change on biodiversity and a host of others.

Studies are planned at depths close to 6,000 metres under six major components — mineral exploration on the sea-bed; study and mapping of biodiversity; study of climate change; exploration of marine biology and developing allied courses, training; development and demonstration of ocean exploration and off-shore technologies for future.

The mission will be spearheaded by the MoES in collaboration with an UN organisation for mineral exploration. The same body is also responsible in identifying areas for exploration in the region.

Though MoES operates desalination plants in Lakshadweep, the off-shore technology planned under the Deep Ocean Mission will allow researchers to explore alternate ways in this area, for which laboratory-based experiments and simulations are planned.

The cabinet approval for the mission is awaited and a formal launch is expected in a couple of months from now, said Rajeevan.

<https://indianexpress.com/article/india/deep-ocean-mission-rs-4000-crore-allocated-to-help-india-strengthen-links-with-its-oceans-7170567/>



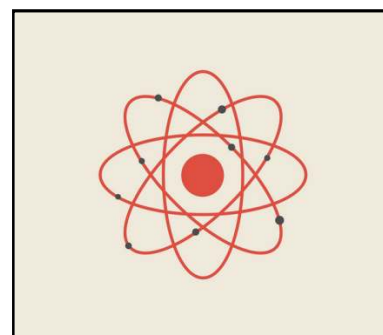
Tue, 02 Feb 2021

The first steps toward a quantum brain

An intelligent material that learns by physically changing itself, similar to how the human brain works, could be the foundation of a completely new generation of computers. Radboud physicists working toward this so-called "quantum brain" have made an important step. They have demonstrated that they can pattern and interconnect a network of single atoms, and mimic the autonomous behavior of neurons and synapses in a brain. They report their discovery in *Nature Nanotechnology* on 1 February.

Considering the growing global demand for computing capacity, more and more data centers are necessary, all of which leave an ever-expanding energy footprint. "It is clear that we have to find new strategies to store and process information in an energy efficient way," says project leader Alexander Khajetoorians, professor of scanning probe microscopy at Radboud University.

"This requires not only improvements to technology, but also fundamental research in game changing approaches. Our new idea of building a 'quantum brain' based on the quantum properties of materials could be the basis for a future solution for applications in artificial intelligence."



Credit: CC0 Public Domain

Quantum brain

For artificial intelligence to work, a computer needs to be able to recognize patterns in the world and learn new ones. Today's computers do this via machine learning software that controls the storage and processing of information on a separate computer hard drive. "Until now, this technology, which is based on a century-old paradigm, worked sufficiently. However, in the end, it

is a very energy-inefficient process," says co-author Bert Kappen, Professor of Neural networks and machine intelligence.

The physicists at Radboud University researched whether a piece of hardware could do the same, without the need of software. They discovered that by constructing a network of cobalt atoms on black phosphorus they were able to build a material that stores and processes information in similar ways to the brain, and, even more surprisingly, adapts itself.

Self-adapting atoms

In 2018, Khajetoorians and collaborators showed that it is possible to store information in the state of a single cobalt atom. By applying a voltage to the atom, they could induce "firing," where the atom shuttles between a value of 0 and 1 randomly, much like one neuron. They have now discovered a way to create tailored ensembles of these atoms, and found that the firing behavior of these ensembles mimics the behavior of a brain-like model used in artificial intelligence.

In addition to observing the behavior of spiking neurons, they were able to create the smallest synapse known to date. Unknowingly, they observed that these ensembles had an inherent adaptive property: their synapses changed their behavior depending on what input they "saw." "When stimulating the material over a longer period of time with a certain voltage, we were very surprised to see that the synapses actually changed. The material adapted its reaction based on the external stimuli that it received. It learned by itself," says Khajetoorians.

Exploring and developing the quantum brain

The researchers now plan to scale up the system and build a larger network of atoms, as well as dive into new "quantum" materials that can be used. Also, they need to understand why the atom network behaves as it does. "We are at a state where we can start to relate fundamental physics to concepts in biology, like memory and learning," says Khajetoorians.

"If we could eventually construct a real machine from this material, we would be able to build self-learning computing devices that are more energy efficient and smaller than today's computers. Yet, only when we understand how it works—and that is still a mystery—will we be able to tune its behavior and start developing it into a technology. It is a very exciting time."

More information: An atomic Boltzmann machine capable of self-adaption, *Nature Nanotechnology* (2021). DOI: [10.1038/s41565-020-00838-4](https://doi.org/10.1038/s41565-020-00838-4) , www.nature.com/articles/s41565-020-00838-4

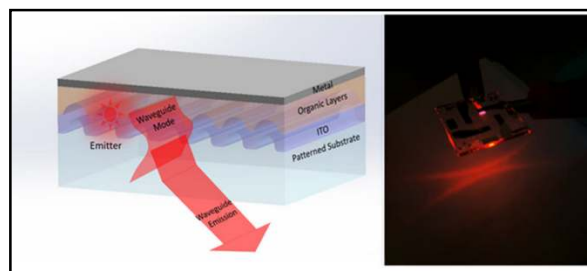
Journal information: [Nature Nanotechnology](https://www.nature.com)
<https://phys.org/news/2021-02-quantum-brain.html>

New photonics research makes smaller, more efficient virtual and augmented reality tech possible

By Matt Shipman

Researchers from North Carolina State University and the University of Texas have developed and demonstrated a new approach for designing photonic devices. The advance allows them to control the direction and polarization of light from thin-film LEDs, paving the way for a new generation of virtual reality (VR) and augmented reality (AR) technologies.

"This is a fundamentally new [device](#) architecture for photonic devices," says Franky So, corresponding author of a paper describing the work. "And we've demonstrated that, using our approach, directional and polarized emissions from an organic LED or a perovskite LED without external optical elements can be realized." So is the Walter and Ida Freeman Distinguished Professor of Materials Science and Engineering at NC State.



Credit: North Carolina State University

In practical terms, an approach that allows for directional control of light using thin-film LEDs makes it possible to develop VR and AR headsets that are substantially lighter and less bulky. And the improved efficiency of the devices means that you get more photons out of the display unit for every electron that you put in.

For AR units, it also means that more light from the outside world gets through to the user. In other words, you'll still be able to see the image being superimposed on your view of the real world, and your view of the real world will be clearer.

"Because the device we've demonstrated is simple to fabricate and can be easily scaled-up, our discovery of this strong directional and polarized light emission from OLEDs and perovskite LEDs has important applications for displays, lighting and other photonic applications," So says.

The paper, "Directional Polarized Light Emission from Thin-Film Light-Emitting Diodes," appears in the journal *Advanced Materials*.

More information: Xiangyu Fu et al. Directional Polarized Light Emission from Thin-Film Light-Emitting Diodes, *Advanced Materials* (2021). [DOI: 10.1002/adma.202006801](https://doi.org/10.1002/adma.202006801)

Journal information: [Advanced Materials](#)
<https://phys.org/news/2021-02-photonics-smaller-efficient-virtual-augmented.html>

Researchers realize single full field-of-view reconstruction fourier ptychographic microscopy

Fourier ptychographic microscopy (FPM) is a recently developed computational imaging technique, which has high-resolution and wide field-of-view (FOV). However, due to the lower light efficiency of the off-axis LEDs, the exposure time of dark-field images has to be extended to improve the signal-to-noise of dark-field images. In addition, effected by the spherical illumination wavefronts of LEDs, the wavevectors of full-FOV are different.

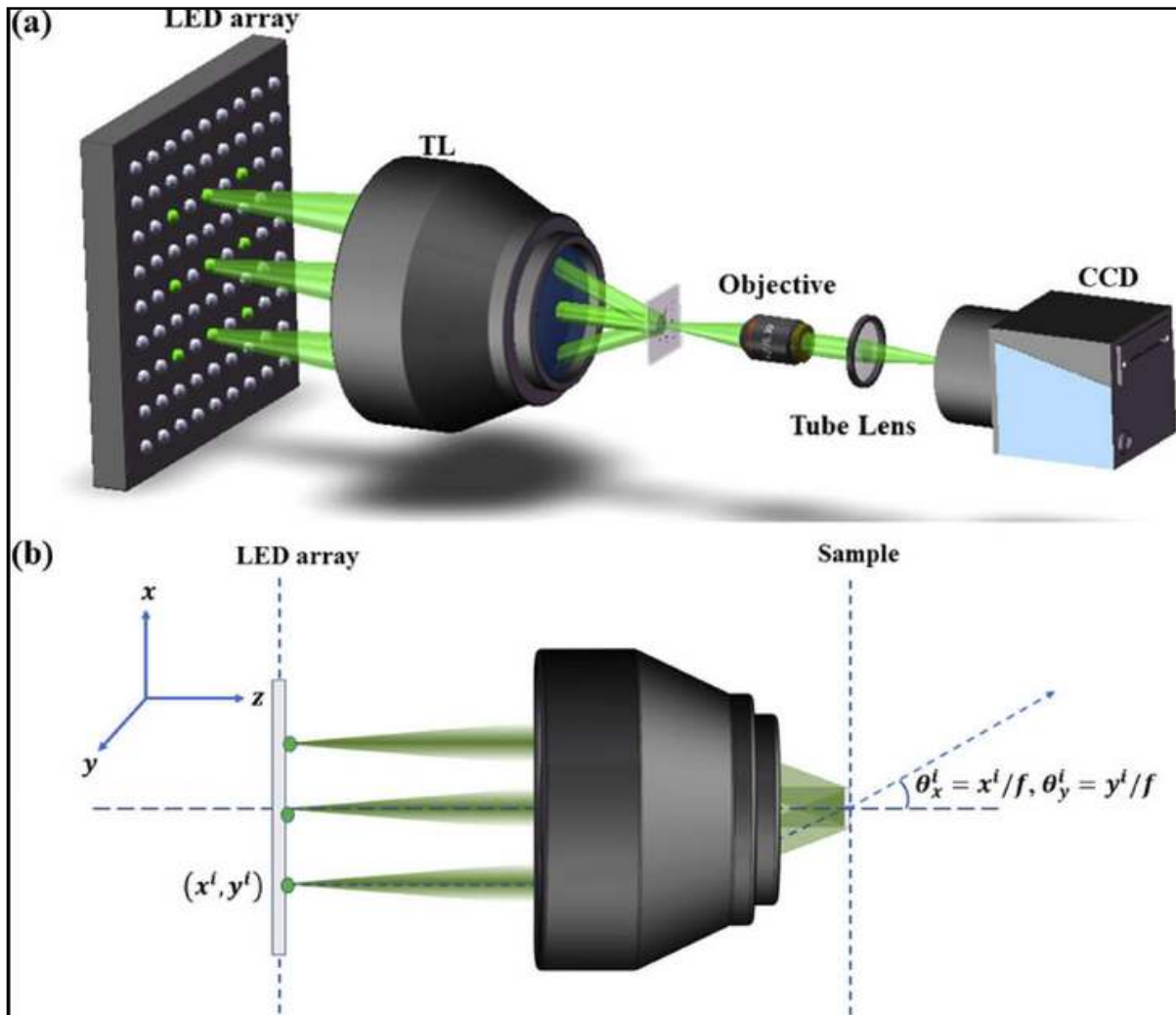


Fig. 1. (a) 3D schematic of F3PM. (b) Telecentric character and f- θ property of TL. *Biomedical Optics Express* (2020). DOI: 10.1364/BOE.409952

Therefore, the full-FOV has to be divided into sub-fields and reconstructed sequentially, and then stitch them to obtain a full-FOV high-resolution images. It is necessary to develop a new illumination method to provide plane wave illumination with uniform intensity and different angles.

In a study published in *Biomedical Optics Express*, a research group led by Prof. MU Quanquan from the Changchun Institute of Optics, Fine Mechanics and Physics of the Chinese Academy of Sciences realized a single full-FOV reconstruction FPM, which is termed full-FOV Fourier ptychographic microscopy (F³PM).

This novel illumination method is achieved by combing LED array and telecentric lens.

The role of telecentric lens is to collect the wavefronts from LEDs and collimates them into plane waves. The telecentric character and excellent plane wavefront of telecentric lens are the key elements in wavefront modulation. Excellent plane wavefront guarantees that the wavevectors are the same for full-FOV and the reconstruction process becomes more flexible, therefore the reconstruction size can be larger, and even the single full-FOV reconstruction can be implemented.

For conventional FPM, the full-FOV images reconstruct process consists of multiple reconstructions, intensity correction for different sub-fields and image stitching. In order to meet the needs of image stitching and light intensity correction, the overlap rate between adjacent sub-fields should be guaranteed 30% or more.

Compared with the conventional FPM, F³PM improves the size of single reconstruction from 0.25 μm^2 to 14.6 mm², and eliminates the steps of image stitching and calculation redundancy. Without these steps, the reconstruction process for full-FOV high-resolution images becomes simpler. Based on multi-coding light scheme and wavefront modulation of telecentric lens, the single full-FOV reconstruction enables the dynamic imaging of FPM.

More information: Youqiang Zhu et al. Single full-FOV reconstruction Fourier ptychographic microscopy, *Biomedical Optics Express* (2020). DOI: [10.1364/BOE.409952](https://doi.org/10.1364/BOE.409952)

Journal information: [Biomedical Optics Express](https://doi.org/10.1364/BOE.409952)

<https://phys.org/news/2021-02-full-field-of-view-reconstruction-fourier-ptychographic.html>

COVID-19 Research News

≡ EL PAÍS

Tue, 02 Feb 2021

Spanish study describes ‘Covid tongue’ as coronavirus symptom

An investigation of more than 600 patients found that 25% of cases experienced alterations in the mucous membrane of their mouth

By Manuel Ansede

When the coronavirus pandemic hit Spanish hospitals in the spring of 2020, many operating theaters had to be closed to make space for Covid-19 patients in need of intensive care. With her operations on skin tumors cancelled, dermatologist Almudena Nuño González, from La Paz hospital in Madrid, decided to volunteer at the field hospital for coronavirus patients set up in Madrid’s Ifema convention center. This hospital, which was quickly assembled at the end of March, treated hundreds of Covid-19 patients during the first wave of the pandemic. The doctor could not help but see these patients through the eyes of a dermatologist, and she began to note striking symptoms, like the so-called “Covid tongue.”

“We found changes in the tongue that until then had not been linked to Covid: the tongue is enlarged, it appears swollen, the teeth marks can be seen and it can also be depapillated, with small indentations in the back where the taste buds are flattened. It looks like a tongue with red markings,” explains Nuño González, whose team announced the findings of the research in a press release on Tuesday.

The dermatologist and her colleagues studied 666



Spanish researchers say that an enlarged, swollen tongue is a symptom of the coronavirus. Genaro Molina / Los Angeles Times via Getty Imag

Covid patients who were admitted to the Ifema field hospital between April 10 and 25 in 2020. The average age of the patient was around 56 and nearly half were of Latin American origin. All had minor or moderate cases of pneumonia. The study from the doctors found that more than 25% of the patients also presented changes in the oral mucosa (the mucous membrane lining the inside of the mouth) such as transient lingual papillitis (11%), which is a kind of blemish on the tongue, mouth ulcers (7%), tongue inflammation with teeth indentations (7%), burning sensation (5%) and tongue inflammation with patchy depapillation or loss of lingual papillae (4%), according to the results, which were published last September in the *British Journal of Dermatology*.

Nuño González explains that other factors could explain some of these symptoms, such as medications or oxygen ventilation, which dries out the mouth and could irritate the tongue. “The depapillated tongue is 100% due to Covid, because this is not caused by any other circumstance or treatment,” she says. “It is a finding that could help with diagnosis, like the loss of smell and taste. They are very characteristic symptoms,” she adds.

The dermatologists also detected alterations in the skin of a patient’s hand and feet in almost 40% of cases, in particular, peeling (25%), red or purple discolored skin (15%) and a burning sensation known as erythrodysesthesia (7%). In total, nearly half the patients studied in Ifema had symptoms in either their skin or oral mucosa.

Many experts have been warning about these possible symptoms since the first wave of the pandemic. In May, for example, Carmen Martín Carreras-Oresas, from the European University in Madrid, published three cases of mouth ulcers or blisters allegedly associated with Covid-19. In July, the odontologist Milagros Díaz Rodríguez, from the same university, described another three cases of symptoms in the oral cavity linked to coronavirus, such as a burning sensation and loss of lingual papillae. Nuño González says that these early reports were received with skepticism, as they only dealt with a few cases. “By studying such a large number of patients, we have been able to show that these symptoms are related to Covid,” she says.

The British epidemiologist Tim Spector, from King’s College in London, also said recently that he has been receiving dozens of reports of tongue problems via the app ZOE, which is used by Covid-19 patients to describe their symptoms. “Spector has corroborated in the general population with minor Covid-19 cases, who stayed at home, the same things that we have seen in patients admitted with pneumonia,” says Nuño González.

But there has been more research into the skin symptoms associated with the coronavirus. Last April, the Spanish Academy of Dermatology and Venereology published a study of the most common skin manifestations of Covid-19, such as chilblain-type inflammation and blistering. Nuño González believes that symptoms affecting the mouth went undetected at the beginning of the pandemic due to the initial chaos. “At the end of March and in early April, there was a lot of fear of the disease. Patients were made to wear a face mask for as much time as possible, and often their mucosas were not examined,” she explains.

https://english.elpais.com/science_tech/2021-02-01/spanish-study-describes-covid-tongue-as-coronavirus-symptom.html

