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A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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*Sat, 15 May 2021*

Defence production policy to be issued soon

By Dinakar Peri

New Delhi: The second negative import list, which has been now rechristened as the positive list, has been delayed due to the ongoing pandemic and will be issued very soon by the Department of Military Affairs (DMA), said Sanjay Jaju, Additional Secretary Defence Production.

The final version of the 'Defence Production and Export Promotion Policy (DPEPP) 2020' will also be put out very soon, Mr. Jaju said speaking at a webinar on "defence testing and certification for speedy procurement" by PHD Chamber of Commerce and Industry.

The draft DPEPP 2020 was released last August for public feedback and once it comes into effect will serve as the overarching guiding document of the Defence Ministry for boosting domestic defence manufacturing as well as exports. The first negative import list issued last year had listed 101 military items that cannot be imported from abroad.

As part of efforts to promote the role of private sector in defence manufacturing testing facilities of DPSUS and DRDO are being opened up for use by private sector while new ones are planned to be set up under the Defence testing Infrastructure Scheme (DTIS).

On this Mr. Jaju said that the Request For Proposal is expected to be floated soon and industry consultations will also begin shortly, "Under DTIS, testing infrastructure is planned to be set up through public private partnership mode..." he stated while listing a series of measures being taken to simplify the testing and certification procedures like self-certification and using simulations, among others. The RFI for DTIS was issued in February this year.

In this regard, Mr. Jaju said during the recent Combined Commanders Conference, the Secretary Defence Production had made a presentation before Prime Minister Narendra Modi on the issue of improving quality assurance and improving the competitiveness of the industry.

The DTIS proposes setting up six to eight greenfield testing facilities in partnership with private sector with a total Grant-in-Aid of ₹400 crore, according to the Directorate General of Quality Assurance.

<https://www.thehindu.com/news/national/defence-production-policy-to-be-issued-soon/article34559971.ece>

Thu, 13 May 2021

New improved Uttam AESA Mk2

A deadly next-generation Uttam active electronically scanned array radar is in making for upcoming Light Combat Aircraft (LCA) Tejas Mk2

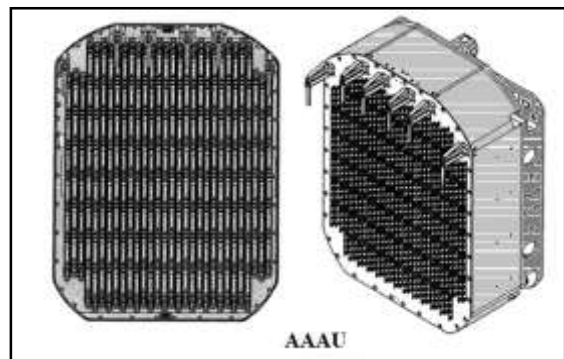
By Subodh Sharma

The realization phase of LCA Tejas MK 2 (Earlier called Medium Weight Fighter) is going on in full swing. The latest information is about the Uttam Active Electronically Scanned Array (AESA) Radar, that is about to enter the fabrication phase. Tejas MK2 will be little over one meter longer than Tejas Mk1 and its wingspan will be increased marginally by 30 centimetres. Overall, the dimensions of the two fighter jets will not be significantly different. It was reported that nose cone area of Tejas MK2 will be smaller than Tejas Mk1 and still this fighter jet will feature AESA radar with more Transmitter and Receiver Modules (TRM). Larger the number of TR modules, longer the range as the beam formed is fine.



Update on Uttam AESA of Tejas Mk2

As per the latest update LRDE is exploring options to transfer the technology to a private sector company. The defence private sector contractor will be responsible for build to specification type of arrangement. LRDE will supply the technology and specifications and the selected private sector company will fabricate this Radar unit.



The initial plan is to fabricate two units of this AESA radar, the first prototype of Tejas Mk2 will be rolled out in March 2022 and it will take its first flight in about 12 months from there. Thus, the timelines of this fabrication suggest that, Radar unit may be available in just about same time as first flight of Tejas Mk2. As this Radar is direct modification of Uttam AESA, thus the testing cycle will be much smaller.

Technical specification

The data available in the public domain suggests that upgraded Uttam AESA of Tejas Mk2 will have 912 – 968 TRM. The arrangement will be Quad modules like in baseline Uttam; these quads then will be arranged in planks.

- Quad: A typical TRM consists of a transmitter and receiver module referred as dipole. This dipole antenna element is configured in multilayer configuration of 4X1 *i.e.* four transmitter and receivers are packed into one module referred as quad.
- Plank: These Quad modules as shown in the image above are arranged in planks. A typical plank can have multiple quad modules arranged linearly. The planned planks on Uttam AESA MK2 will have 8 QTRM based planks and 6 QTRM based planks.

These planks with 8 and 6 QTRM will have 32 and 24 TR modules respectively arranged in packed formation. This high-density packing will allow this AESA radar to have more TR modules and occupy smaller area in the nose cone.

Timeline

These Antenna Array Units (AAU) should be delivered, Certified and Integrated on a Tejas Mk2 Aircraft within 32 weeks. This indicates that AAU will be available for the first flight of the

first prototype. The Tejas Mk2 likely will enter the flight trials in 2023 and production in 3-5 years from there based on the results of trials. This timeline allows this new AESA radar to get matured and form the baseline for the further improved radar of AMCA.

Importance of this Radar

Uttam AESA is a modular and scalable radar unit. The radar unit designed for the LCA Tejas MK1A can be easily modified for the requirements of Indian Airforce. This Radar system can be scaled up for the potential application on Super Sukhoi, Mig29 UPG or even Mirage 2000.

The radar system will allow the Indian airforce to integrate just about anything at the disposal to enhance the capabilities of the existing systems significantly.

Just for the comparison, the Tejas Mk2 will have a radar with more TRM than RBE2 of Rafale fighter jet.

- Baseline Uttam AESA – 736 TR modules
- RBE2 of Rafale – 838 – 1100 TR modules (based on the variant)
- AN/APG-68 offered on F21 – Around 1000 TR modules
- Uttam MK2 – 912 – 968 TR modules

Though the range and the ability to track the stealthy targets is not limited to number of TR modules, there are numerous other factors involved. 912-968 TR modules is an impressive number.

In addition, since Tejas Mk2 will have a coating of Radar absorbent material. Thus, this aircraft will have a smaller RRS. So, in comparison Tejas Mk2 can locate its target at much longer distance and make detection difficult for the adversaries. This will allow Tejas Mk2 to see its enemy first and fire at them first.

Range of Uttam AESA Mk2

Calculating the range of a fighter jet radar is a complex affair, it depends on multiple factors. Although by the use of peak power, range of various fighter jets can be compared. The current radar of Tejas EL/M – 2032 has a peak power of 10 W per TR module. Assuming the peak power is retained then improved Uttam should have $912 \times 10 = 9120$ W of peak power. In comparison current Uttam AESA will have $736 \times 10 = 7360$ W of peak power. This indicates Uttam Mk2 will have approximately 20% more peak power than baseline Uttam, resulting similar increase in detection range.

The other advantage that increased number of TR modules and channels offer is increased number of target tracking. The radar will be able to track more targets in track while scan mode. This will allow Tejas to prioritize the targets and take on multiple aircrafts in air demonstrating air dominance capabilities.

Overall, this new addition will make India adroitly Atmanirbhar.

<https://alphadefense.in/new-improved-uttam-aesa-lca-mk2/>

Mon, 17 May 2021

Defence Minister Rajnath Singh to release first batch of DRDO anti-Covid drug on Monday

Defence Minister Rajnath Singh will release the first batch of DRDO-developed anti-Covid drug 2-DG on May 17

By Abhishek Bhalla

New Delhi: The first batch of the 2-deoxy-D-glucose (2-DG) drug developed by the Defence Research and Development Organisation (DRDO) for treatment of Covid-19 will be released by Defence Minister Rajnath Singh on Monday. He will be accompanied by Health Minister Harsh Vardhan.

Hospitals will begin to receive supplies of the drug from Monday onwards. To start with, nearly 10,000 doses will be supplied to various hospitals in Delhi.

The Drugs Controller General of India (DCGI) had on May 8 approved the drug for emergency use in moderate to severe cases of Covid-19.

About 2-DG

The anti-Covid therapeutic application of the drug 2-deoxy-D-glucose (2-DG) was developed by Institute of Nuclear Medicine and Allied Sciences (INMAS), a lab of DRDO in collaboration with Dr Reddy's Laboratories (DRL), in Hyderabad.

Clinical trial results show that the drug enables faster recovery of hospitalised Covid-19 patients and reduces their supplemental oxygen dependence. Covid patients treated with 2-DG showed a higher proportion of RT-PCR negative conversion.

Patients treated with 2-DG also showed faster recovery from symptoms. A difference of 2.5 days was seen in the median time taken to achieve normalisation of specific vital signs parameters between those given the drug and those who were not.

The drug comes in the form of powder in a sachet. It has to be dissolved in water and taken orally. The drug accumulates in the virus-infected cells and prevents virus growth by stopping viral synthesis and energy production. Its selective accumulation in virally infected cells makes it a unique drug.

Clinical trials

In April 2020, during the first wave of the pandemic, INMAS-DRDO scientists conducted laboratory experiments with the help of Centre for Cellular and Molecular Biology in Hyderabad and found that this molecule works effectively against SARS-CoV-2 virus and inhibits the viral growth.

Based on these results, the DCGI's Central Drugs Standard Control Organisation (CDSCO) permitted Phase-II clinical trials of 2-DG in Covid-19 patients in May 2020.

In the Phase-II trials conducted till October last year, the drug was found to be safe for Covid-19 patients and led to significant improvement in their condition. Phase II-A was conducted in six



Defence Minister Rajnath Singh will release the first batch of DRDO-developed anti-Covid drug 2-DG on May 17. (Photo: File)

hospitals and Phase II-B clinical trial was conducted at 11 hospitals across India. The Phase-II trial was conducted on a total of 110 patients.

Based on successful results, DCGI further permitted the Phase-III clinical trials in November 2020. The Phase-III clinical trial was conducted on 220 patients between December 2020 and March 2021 at 27 Covid hospitals in Delhi, Uttar Pradesh, West Bengal, Gujarat, Rajasthan, Maharashtra, Andhra Pradesh, Telangana, Karnataka and Tamil Nadu. Detailed data of Phase-III clinical trial was presented to the DCGI.

<https://www.indiatoday.in/india/story/rajnath-singh-release-first-batch-drdo-covid-drug-monday-1803273-2021-05-16>



Mon, 17 May 2021

10,000 Packets of DRDO's anti-covid oral drug to be distributed today

2-deoxy-D-glucose or 2-DG was developed by a DRDO lab in collaboration with Hyderabad-based pharma giant, Dr Reddy's Laboratories

By Rajeev Ranjan, Edited by Vaibhav Tiwari

New Delhi: An anti-coronavirus drug developed by Defence Research and Development Organisation (DRDO) will be launched today, with Union Defence Minister Rajnath Singh distributing around 10,000 doses to some hospitals in the national capital.

The drug, called 2-deoxy-D-glucose or 2-DG, was developed by a DRDO lab in collaboration with the Hyderabad-based pharma giant, Dr Reddy's Laboratories. Drugs Controller General of India (DCGI), the country's top drug regulator, has approved the medicine for emergency use.

The medicine was found to be safe for COVID-19 patients in phase 2 trials, conducted between May and October last year. It was found to be effective in cutting short the hospital stays of Covid patients and reducing their supplemental oxygen dependence.

A kind of pseudo glucose molecule in the drug stops the virus in its tracks, the defence body says. The medicine comes in powder form and can be taken with water.

2-DG is one of the few medicines across the world that have been designed specifically to treat COVID-19, which, as of now, has no cure. Doctors use several experimental drugs and procedures, including Remdesivir, Ivermectin, plasma therapy and some steroids, to treat the deadly infection.

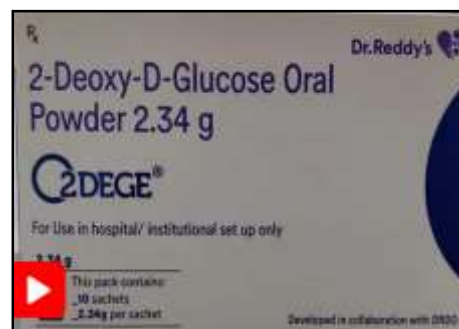
India has been reporting over 3 lakh coronavirus cases and thousands of deaths every day for the last few weeks as the more dangerous second wave of the coronavirus ravaged the country.

Amid the mayhem unleashed by the virus and exacerbated by shortages of medicines, hospital beds and live-saving oxygen, cases of a horrifying secondary infection, commonly called 'Black Fungus', have emerged from several states.

Experts say because of the misuse of steroids - which can diminish the natural immunity of the body, fungal and bacterial infections are killing active and cured Covid patients.

"Misuse of steroids is a major cause behind this infection. Chances of fungal infection increase in the patients who are diabetic, Covid positive and those who are taking steroids. To prevent it, we should stop the misuse of steroids," AIIMS Director Randeep Guleria had said on Saturday.

<https://www.ndtv.com/india-news/10-000-packets-of-research-body-drdo-anti-covid-drug-cleared-for-emergency-use-to-be-distributed-tomorrow-2442911>



10,000 Packets Of DRDO's Anti-Covid Oral Drug To Be Distributed Today

DRDO की एंटी-कोविड मेडिसन आज से होगी उपलब्ध, रक्षा मंत्री राजनाथ सिंह समेत हर्षवर्धन करेंगे रिलीज

डीआरडीओ की एंटी-कोविड मेडिसन, 2डीजी आज से कोरोना मरीजों के लिए उपलब्ध होने जा रही है।

रक्षा मंत्री राजनाथ सिंह और स्वास्थ्य मंत्री डॉक्टर हर्षवर्धन आज मेडिसन के पहले

बैच को वीडियो कॉन्फ्रेंसिंग के जरिए रिलीज करेंगे।

By नीरज राजपूत

डीआरडीओ की एंटी-कोविड मेडिसन, 2डीजी आज से उपलब्ध होने जा रही है। देश के रक्षा मंत्री राजनाथ सिंह और स्वास्थ्य मंत्री डॉक्टर हर्षवर्धन सुबह 10.30 बजे 2डीजी मेडिसन के पहले बैच को राजधानी दिल्ली से वीडियो कॉन्फ्रेंसिंग के जरिए रिलीज करेंगे।

जानकारी के मुताबिक, डीआरडीओ की हैदराबाद स्थित इंस्टीट्यूट-पार्टनर, डॉक्टर रेड्डीज़ लैब ने पहले बैच में कुल 10 हजार डोज तैयार की हैं। इसके बाद जून के महीने से हर हफ्ते एक लाख सैशे तैयार किए जाएंगे। गौरतलब है की एबीपी न्यूज ने रविवार की सुबह सबसे पहले 2डीजी के आने की सबसे पहले खबर दी थी। इस खबर पर अब रक्षा मंत्रालय और रक्षा मंत्री ने ट्वीट कर आधिकारिक जानकारी दी है।



डीआरडीओ-2डीजी

पानी में घोलकर पीने वाली ये दवा जल्द दूसरे अस्पतालों में भी उपलब्ध होने की संभावना

कोरोना महामारी से लड़ने के लिए डीआरडीओ की एंटी-कोविड मेडिसन, 2डीजी आज से मरीजों को मिलनी शुरू हो जाएगी। सूत्रों के मुताबिक, हैदराबाद की डॉक्टर रेड्डीज़ लैब में 10 हजार डोज बनकर तैयार हो गई हैं और आज डीआरडीओ के हॉस्पिटल्स में उपलब्ध भी हो जाएगी। सैशे में उपलब्ध इस दवाई की सैंपल-तस्वीर एबीपी न्यूज के पास मौजूद है।

एबीपी न्यूज को मिली जानकारी के मुताबिक, इस 10 हजार डोज के बाद डीआरडीओ के कहने पर डॉक्टर रेड्डीज़ लैब जून के महीने से हर हफ्ते एक लाख डोज बनना शुरू कर देगी। इसके बाद पानी में घोलकर पीने वाली ये दवाई जल्द ही दूसरे अस्पतालों में भी उपलब्ध हो सकती है।

दवा के सेवन से कोरोना मरीजों को ऑक्सजीन पर ज्यादा निर्भर नहीं होना पड़ेगा- डीआरडीओ

आपको बता दें कि कोरोना महामारी के बीच पिछले हफ्ते डीआरडीओ ने एक बड़ी राहत की खबर दी थी। डीआरडीओ ने एंटी-कोविड दवाई बनाने का दावा किया था। डीआरडीओ का दावा है कि ग्लूकोज़ पर आधारित इस दवाई के सेवन से कोरोना से ग्रस्त मरीजों को ऑक्सजीन पर ज्यादा निर्भर नहीं होना पड़ेगा और जल्दी स्वस्थ हो जाएंगे। डीआरडीओ ने एंटी-कोविड मेडिसन '2-डिओक्सी-डी-ग्लूकोज़' (2डीजी) को डॉक्टर रेड्डी लैब के साथ मिलकर तैयार किया है और क्लीनिकल-ट्रायल के बाद ड्रग्स कंट्रोलर जनरल ऑफ इंडिया ने इस दवाई को इमरजेंसी इस्तेमाल के लिए हरी झंडी दे दी है।

डीआरडीओ की दिल्ली स्थित इंस्टीट्यूट ऑफ न्युक्लियर मेडिसन एंड एलाइड साइंसेज़ (इनमास) ने हैदराबाद की रेड्डी लैब के साथ मिलकर इस दवाई को तैयार किया है। डीआरडीओ का दावा है कि

क्लीनिकल-ट्रायल के दौरान ये पाया गया कि जिन कोविड-मरीजों को ये दवाई दी गई थी, उनकी आरटीपीसीआर रिपोर्ट जल्द नेगेटिव आई है।

पिछले साल अप्रैल महीने से चल रहा था दवा पर काम- रक्षा मंत्रालय

डीआरडीओ की इस दवाई को लेकर खुद रक्षा मंत्रालय ने आधिकारिक तौर से जानकारी देते हुए बताया था कि ये एक जैनेरिक मोलिक्यूल है और ग्लूकोज का एक एनोलोग है, इसलिए ये भरपूर मात्रा में मार्केट में उपलब्ध है। ये एक सैचे में पाउडर फॉर्म में मिलती है और पानी में घोलकर पी जा सकती है।

रक्षा मंत्रालय के मुताबिक, पिछले साल यानि अप्रैल 2020 से इस दवाई पर काम चल रहा था। क्योंकि प्रधानमंत्री मोदी ने पिछले साल ही डीआरडीओ यानी डिफेंस रिसर्च एंड डेवलपमेंट ऑर्गेनाइजेशन को कोरोना के खिलाफ लड़ने के लिए तैयार रहने का आदेश दिया था। इसके बाद डीआरडीओ ने खुद इस 2डीजी दवाई का थेरेपियेटिक इस्तेमाल किया और लैब में इस पर परीक्षण किया। ये परीक्षण हैदराबाद की सेंटर फॉर सेलेल्यूर एंड मोलिक्यूलर बायोलॉजी (सीसीएमबी) के साथ किए गए थे, और इसमें पाया गया कि सारस-कोविड-2 वायरस के खिलाफ ये सही काम करता है और वायरल-ग्रोथ को रोकने में कामयाब है। इन परिणामों के बाद डीसीजीआई यानि ड्रग्स कंट्रोलर जनरल ऑफ इंडिया ने इस दवाई के फेज-2 क्लीनिकल ट्रायल की इजाजत दी।

फेज-3 के ट्रायल 27 अस्पतालों में किए गए- रक्षा मंत्रालय

डीआरडीओ ने इसके बाद हैदराबाद की अपनी इंडस्ट्री-पार्टनर, डाक्टर रेड्डी लैब के साथ मई 2020 से लेकर अक्टूबर तक दूसरे फेज के क्लीनिकल ट्रायल किए। इस दौरान पाया गया कि ये कोरोना से ग्रस्त मरीजों पर कारगर साबित हो रही है। फेज-2ए के ट्रायल छह बड़े अस्पतालों में किए गए। रक्षा मंत्रालय के मुताबिक, फेज-2बी के ट्रायल 11 अस्पतालों में 110 मरीजों पर किए गए।

डीआरडीओ की मानें तो फेज-2 के सभी ट्रायल में ये पाया गया कि कोरोना से ग्रस्त मरीजों को जो स्टैंडर्ड ऑफ केयर (एसओसी) यानि जो दूसरे इलाज के तरीके थे उनसे 2डीजी दवाई के मुकाबले मरीज ढाई दिन पहले ही सही हो रहे थे। इन परिणामों के आधार पर डीसीजीआई ने डीआरडीओ को फेज-3 यानि आखिरी चरण के क्लीनिकल ट्रायल की इजाजत दी, जो दिसम्बर 2020 से शुरू होकर मार्च 2021 तक चले।

रक्षा मंत्रालय की मानें तो फेज-3 के ट्रायल कुल 220 मरीजों पर किए गए। ये परीक्षण दिल्ली, पश्चिम बंगाल, उत्तर प्रदेश, गुजराज, राजस्थान, आंध्र-प्रदेश, तेलंगाना, कर्नाटक और तमिलनाडु के कुल 27 अस्पतालों में किए गए। इन ट्रायल के परिणाम डीसीजीआई के सामने प्रस्तुत किए गए। इन परिणामों में पाया गया कि जिन कोविड मरीजों को 2डीजी दवाई दी जा रही थी उन्हें ऑक्सीजन देने की जरूरत बेहद कम पड़ रही थी। तीसरे दिन से ही मरीजों में इस दवाई का असर दिखाई देने लगा था। जबकि इसी दौरान जो दूसरी दवाईयां कोविड मरीजों को दी जा रही थी उन्हें आर्टिफिशियल-ऑक्सीजन देने की जरूरत पड़ रही थी। इसी तरह के परिणाम 65 साल से अधिक आयु वाले कोविड मरीजों में भी देखने को मिले।

इन क्लीनिकल ट्रायल के नतीजों के बाद 1 मई को डीसीजीआई ने इस 2डीजी दवाई को कोरोना से ग्रस्त मोडरेट और सीरियस (गंभीर) मरीजों को 'एडजंक्ट थेरेपी' के तौर पर इस्तेमाल की परमिशन दे दी।

दवा का वायरस के साथ घुल जाने से उसकी ग्रोथ नहीं हो पाती- डीआरडीओ

डीआरडीओ के एक साइंटिस्ट ने एबीपी न्यूज को बताया कि ये 2डीजी दवाई कोविड से ग्रस्त मरीज के शरीर में वायरस के साथ घुल जाती है। इसके चलते वायरस की ग्रोथ नहीं हो पाती। इसके वायरस के साथ मिल जाना ही इस दवाई को अलग बना देता है।

कोरोना की दूसरी लहर के दौरान जब मरीजों को ऑक्सीजन की बेहद जरूरत है, ऐसे में इस दवाई से ऑक्सीजन पर निर्भरता बेहद कम हो जाएगी। डीआरडीओ के एक अधिकारी ने एबीपी न्यूज को बताया कि क्योंकि इस दवाई को डीसीजीआई ने इमरजेंसी इस्तेमाल की इजाजत दी है। ऐसे में अभी ये सिर्फ अस्पतालों में ही मरीजों को मिल सकेगी--मेडिकल स्टोर पर नहीं मिलेगी।

<https://www.abplive.com/news/india/drdo-anti-covid-medicine-will-be-available-from-today-rajnath-singh-and-harsh-varadhan-will-release-ann-1914803>



Mon, 17 May 2021

DRDO's 2DG medicine to treat Covid-19: Availability, dosage, price

2DG will work against variants too as it stops virus growth. Once the growth is inhibited, there will be no sudden rise in the demand of oxygen in the body, scientists said

Edited by Poulomi Ghosh

The 2-deoxy-D-glucose drug, the first such medicine in India meant to treat Covid-19 infections, is likely to be available from the coming week, news agency ANI reported. In the first batch, 10,000 doses of this medicine will be launched. In the last year, medical experts deliberated on the effectiveness of several drugs including Hydroxychloroquine, Remdesivir, Ivermectin. But 2-DG is the first one to be termed as an anti-Covid drug. The apex drug controller of the country has allowed this drug for emergency use among Covid-19 patients

Here is all we need to know about this drug:

Manufacturers: The drug has been developed by the Defence Research and Development Organisation's laboratory Institute of Nuclear Medicine and Allied Sciences. Hyderabad-based Dr Reddy's Laboratories has been a partner and it is manufacturing the drug for public use.

How will the drug work?

The drug is a repurposed drug as the 2-DG molecule is meant for treating tumour, cancer cells. This is a glucose analogue, which looks like glucose but is not. A virus that is multiplying fast in the body needs glucose for energy. Thus, the virus will take this glucose analogue and will get arrested. The drug will then stop the virus from multiplying.

How will it treat Covid-19 patients with oxygen level dropping?

Director of the Institute of Nuclear Medicine and Allied Sciences, Dr Anil Mishra, has explained in an interview to All India Radio that the oxygen demand increases as the virus is multiplying fast in the body. Once that process is stopped, the oxygen crisis will also be addressed.

Will this drug work on variants of the virus?

Dr Mishra has said that the way the drug functions is supposed to arrest any variant as a multiplying virus, irrespective of variant, will need food and thus will get trapped by the drug.

Price

INMAS scientist Dr Sudhir Chandna has said that the pricing will be determined by Dr Reddy's laboratories, which is manufacturing the doses. Dr Mishra said the pricing will be done keeping affordability in mind.

Dosage

Dr Sudhir Chandna has said like glucose powder, this drug can be taken with water, twice a day. A Covid-19 patient may have to take this drug for five to seven days to get completely cured.

<https://www.hindustantimes.com/india-news/drdo-2dg-medicine-to-treat-covid-19-availability-dosage-price-101621160474807.html>

कोरोना की एक और दवा: डीआरडीओ निर्मित 2-डीजी दो-तीन दिन में मिलेगी बाजार में

By गोविंद पांडेय

सार

कोरोना की एक और दवा दो से तीन दिनों में बाजार में उपलब्ध होगी। यह पाउडर के रूप में होगी और जून तक सभी मरीजों के लिए उपलब्ध हो जाएगी।

विस्तार

कोरोना से जंग के लिए रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) की नई दवा 2-डीजी दो-तीन दिन में बाजार में आ जाएगी। दवा पर रिसर्च करने वाली टीम के मुख्य वैज्ञानिक डॉ. अनंत नारायण भट्ट का कहना है कि यह अगले हफ्ते से कोरोना के मरीजों को मिलने लगेगी। दवा पाउडर के रूप में होगी और जून तक सभी मरीजों के लिए उपलब्ध हो जाएगी।



डॉ. अनंत नारायण भट्ट - फोटो : amar ujala

डीआरडीओ की रिसर्च लैब इंस्टीट्यूट ऑफ न्यूक्लियर एंड एलायड साइंसेज (इनमास) के साइंटिस्ट डॉ. भट्ट ने बताया कि ड्रग्स कंट्रोलर जनरल ऑफ इंडिया (डीसीजीआई) से इस दवा को मंजूरी के बाद डॉक्टर रेड्डी लैब ने इसके उत्पादन पर तेजी से काम किया है। इस दवा से उन मरीजों को खासतौर पर फायदा होगा जो वेंटिलेटर पर या ऑक्सीजन के सहारे हैं। ऐसे मरीज जल्द ठीक हो सकते हैं।

कोरोना की अन्य दवाओं से सस्ती होगी

डॉ. भट्ट ने कहा कि इसकी कीमत पर डीआरडीओ का हस्तक्षेप रहेगा, इसलिए यह कोरोना की अन्य दवाओं की तुलना में काफी सस्ती और सामान्य लोगों के बजट में होगी। उन्होंने अनुमान जताया कि यह 500 से 600 रुपये में लोगों को मिल सकेगी। हालांकि यह भी कहा कि पैकेजिंग आदि के खर्च की जानकारी नहीं है, इसलिए पहली खेप बाजार में आने के बाद ही कुछ स्पष्ट कहा जा सकेगा।

जून से रोजाना 50 हजार से अधिक डोज

उत्पादन पर तेजी से काम हो रहा है। उम्मीद है कि जून से इस दवा की रोजाना 50 हजार से एक लाख डोज लोगों को उपलब्ध कराई जा सकेगी।

संक्रमण होने के बाद भी लाभदायक

डॉ. भट्ट ने कहा कि वायरल इंफेक्शन में शुरू में ही काम करना होता है, लेकिन यह दवा संक्रमण की शुरुआत के साथ ही बाद में भी उससे निजात दिलाने में अच्छी भूमिका निभाती है।

<https://www.amarujala.com/lucknow/drdo-invented-a-medicine-to-prevent-corona-infection?pageId=1>

नए म्यूटेशन से निपटने में कैसे काम आएगी DRDO की नई दवा 2-DG, जानें हर सवाल का जवाब

DRDO New Medicine For Corona: हमारा इम्यून सिस्टम एक दीवार की तरह होता है। मान लीजिए कि कोई दीवार इतनी मजबूत होती है कि आप 10 बार भी उस पर चोट करें, तो उसे कुछ नहीं होगा। इसके विपरीत एक कमजोर दीवार पर 3-4 बार चोट करने पर ही दरार दिखने लगती है।

By Pankaj Sinha

नई दिल्ली: पिछले दिनों ड्रग कंट्रोलर ऑफ इंडिया ने रक्षा अनुसंधान एवं विकास संगठन (DRDO) की बनाई एक दवा 2डीजी कोरोना मरीजों को दिए जाने की सिफारिश की है। यह दवा आईएनएमएएस-डीआरडीओ के दो वैज्ञानिकों डॉ. सुधीर चांदना और डॉ. अनंत भट्ट ने तैयार की है। क्या है यह दवा और कैसे यह काम करती है, इस पर डीआरडीओ के रेडिएशन बायोसाइंस विभाग के हेड डॉ. सुधीर चांदना ने विस्तार से बताया है।

सबसे पहले इस दवा के बारे में बताइए, क्या यह वायरस को खत्म कर सकती है?

यह दवा ग्लूकोज का बदला हुआ रूप है। इसे 2 डीऑक्सी-डी-ग्लूकोज (2डीजी) कहते हैं। यह दवा वायरस की ग्रोथ रोकती है। ऐसा हमने पिछले साल अप्रैल-मई में एक्सपेरिमेंट करके टेस्ट किया। वायरस से हमारे शरीर में जब कुछ सेल्स इन्फेक्ट हो जाते हैं, तब वे ज्यादा ग्लूकोज मांगते हैं। हम मरीज को ग्लूकोज का यह बदला हुआ रूप देते हैं, तो इसके साथ-साथ 2डीजी भी उन सेल्स में जाता है और वायरस की ग्रोथ में रुकावट आ जाती है। जब हम मरीज को सुबह शाम इसकी डोज देते हैं तो वायरस आगे ग्रो नहीं कर पाता और तब हमारा सिस्टम वायरस को खत्म करने में मदद करता है।

वायरस पहले के 2-3 दिन गले या नाक में रहता है, क्या पहले दिन से ही यह दवा दी जा सकती है?

जो क्लिनिकल ट्रायल हमने किए, वे हमने अस्पताल में भर्ती मरीजों पर किए। उन मरीजों पर जो शुरुआती दौर से निकल कर मॉडरेट लेवल पर आ चुके थे, और कुछ गंभीर मरीज भी थे। पर हां, इस दवा का जो मैकेनिज्म है वह शुरुआती दौर में लेने में भी बहुत फायदा करेगा। अभी हमें मॉडरेट से सीवियर मरीजों पर इसके इस्तेमाल की अनुमति मिली है, आगे जैसे-जैसे दवा का प्रयोग बढ़ेगा, ड्रग कंट्रोलर से ही आगे के दिशा-निर्देश लिए जाएंगे।

इस दवा को बनाने की शुरुआत कैसे हुई?

मेरे साथी डॉ. अनंत नारायण भट्ट ने इस विषय पर पिछले साल मार्च-अप्रैल के आसपास बातचीत की और बताया कि इस दवा को लेकर पहले से कई सारी रिपोर्ट्स और स्टडीज हैं। उन स्टडीज में पाया गया कि इसके मॉलिक्यूलस ने कई तरह के वायरसों की बढ़त रोक दी। ये स्टडीज 1959 से लेकर 2018-19 के बीच की थीं। अब हमारे सामने कोरोना वायरस था, जिस पर इसके असर की स्टडी करनी थी। उसके लिए मेरे साथी डॉ. अनंत सेंटर फॉर सेल्युलर एंड मॉलिक्यूलर बायोलॉजी, हैदराबाद गए, जहां कोरोना के कल्चर की स्टडी होती है।

हमारे चेयरमैन डॉ. जी सतीश रेड्डी का कहना था कि अगर इस दवा में दम है तो हमें काम शुरू करना चाहिए। हमने काम शुरू किया तो एक्सपेरिमेंट में ये बात सामने आई कि कोरोना वायरस जब सेल्स में इन्फेक्ट करता है, तो इस दवा को देने से इसकी ग्रोथ रुक जाती है। मगर सार्स कोविड वायरस पर एक्सपेरिमेंट करना आसान नहीं है, तो बार-बार ये एक्सपेरिमेंट्स किए गए। जब नतीजे पॉजिटिव आने लगे,

तो हमने ड्रग कंट्रोलर से आग्रह किया कि हमें क्लिनिकल ट्रायल की मंजूरी दी जाए। हमने जो क्लिनिकल ट्रायल किए, उनमें सभी पेशेंट अस्पताल में ऑक्सिजन सपोर्ट पर थे।

आरटी पीसीआर रिपोर्ट में सीटी वैल्यू आती है तो क्या यह माना जाए कि इस दवा की खुराक भी उस वैल्यू से निर्धारित होगी?

हमारा इम्यून सिस्टम एक दीवार की तरह होता है। मान लीजिए कि कोई दीवार इतनी मजबूत होती है कि आप 10 बार भी उस पर चोट करें, तो उसे कुछ नहीं होगा। इसके विपरीत एक कमजोर दीवार पर 3-4 बार चोट करने पर ही दरार दिखने लगती है। ठीक उसी तरह कमजोर इम्यून सिस्टम पर लक्षण जल्दी दिखने लगते हैं। फिर इंसान का इम्यून सिस्टम ही तय करता है कि किसी वायरस का उसके शरीर में कितना असर होगा। इसलिए सीटी वैल्यू मात्रा बताती है, और उसका लक्षणों से सीधा ताल्लुक नहीं मिला है।

कोरोना में अब कोई एक मानक लक्षण नहीं, अलग-अलग लक्षण हैं, क्या यह दवा सभी तरह के लक्षणों पर असरदार होगी?

अस्पतालों में भर्ती मरीजों में भी बहुत से लक्षण होते हैं। 220 एक अच्छा-खासा नंबर है। क्लिनिकल ट्रायल में इन मरीजों में लगभग सभी तरह के लक्षण देखे गए। दरअसल यह दवा ग्लूकोज एनालॉग है, जो ग्लूकोज के जरिए पूरे शरीर में जाती है, और वहां ज्यादा पहुंचती है, जहां वायरस मौजूद होता है। इसका सीधा काम वायरस की ग्रोथ को रोकना है।

कोविड वायरस में कई सारे म्यूटेशन भी हो रहे हैं। क्या यह दवा सारे म्यूटेशंस पर भी काम करेगी? म्यूटेशन की बात करें तो सारे म्यूटेंट्स हमारे शरीर के सेल्स को इन्फेक्ट करते हैं। यह दवा हमारे इन्फेक्टेड सेल्स पर कारगर होती है और वहीं पर वायरस को आगे बढ़ने से रोक देती है।

क्या यह दवा बच्चों के लिए भी काम आएगी?

जो क्लिनिकल ट्रायल हुए हैं, वे सभी पेशेंट 18 साल की उम्र से बड़े थे। तो बच्चों को यह दवा दी जाएगी या नहीं, यह ड्रग कंट्रोलर ही तय करेंगे। वैसे यह दवा नुकसान नहीं करती और इसकी बहुत माइल्ड डोज ही दी जाती है।

<https://navbharattimes.indiatimes.com/india/drdo-covid-medicine-all-you-need-to-know-about-anti-covid-19-drug-2-dg/articleshow/82652614.cms>

DRDO की कोरोनारोधी दवा 2-डीजी से जगी

उम्मीद, संभव होगा कोरोना का इलाज

डीआरडीओ ने एक ऐसी दवा विकसित की है जिसे कोरोना संक्रमण के इलाज में बहुत कारगर माना जा रहा है। इस दवा ने इस बीमारी से बचाव की एक उम्मीद जगाई है।

By Sanjay Pokhriyal, योगेश कुमार गोयल

कोरोना संक्रमण की बढ़ती रफ्तार से पूरा देश त्राहिमाम कर रहा है। ऐसे में किसी ऐसी 'संजीवनी' की दरकार है जो इस बीमारी को नियंत्रित कर सके। ऐसे में उम्मीद की बड़ी किरण बनकर सामने आया है रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) जो न सिर्फ देश को रक्षा क्षेत्र में आत्मनिर्भर बनाने की दिशा में जुटा है, बल्कि कोरोना महामारी के दौर में भी निरंतर हरसंभव मदद के प्रयासों में जुटा है। ऐसे समय में जब इसकी वैक्सीन की मांग काफी बढ़ गई हो और आपूर्ति बहुत कम हो, किसी ऐसी दवा की सख्त जरूरत महसूस की जा रही है, जो प्रतिदिन कोरोना के बढ़ रहे ग्राफ को तेजी से नीचे ला सके और लाखों देशवासियों की जान बचाई जा सके।

इस नई दवा के परीक्षण में जो नतीजे सामने आए हैं, उन्हें देखते हुए माना जा रहा है कि डीआरडीओ की प्रतिष्ठित प्रयोगशाला नाभिकीय औषधि तथा संबद्ध विज्ञान संस्थान (आइएनएमएएस) द्वारा विकसित की गई 2-डीजी दवा कोरोना के इलाज में गेमचेंजर साबित हो सकती है। दावा किया गया है कि इस दवा के इस्तेमाल से मरीज जल्दी ठीक हो रहे हैं। दवा नियामक ड्रग्स कंट्रोलर जनरल ऑफ इंडिया (डीजीसीआइ) द्वारा डीआरडीओ की बनाई हुई कोरोना की नई दवा 2-डीऑक्सी-डी-ग्लूकोज (2-डीजी) के आपात इस्तेमाल की मंजूरी दे दी गई है।



रक्षा मंत्रालय का इस दवा के संबंध में कहना है कि 2-डीजी के साथ जिन मरीजों का इलाज हुआ, उनमें से अधिकांश की आरटीपीसीआर रिपोर्ट नेगेटिव आई और उनमें तेजी से रोग के लक्षणों में कमी देखी गई। मुंह के जरिये ली जाने वाली इस दवा का अब कोरोना के मध्यम से गंभीर लक्षण वाले मरीजों के इलाज में इस्तेमाल किया जा सकेगा। यह दवा पाउडर के रूप में एक पैकेट में आती है, जिसे पानी में घोलकर मरीज को दिया जाता है। परीक्षण में डीआरडीओ की इस दवा के काफी अच्छे नतीजे सामने आए हैं और इसके क्लिनिकल ट्रायल सफल साबित हुए हैं। डीआरडीओ का दावा है कि जिन मरीजों पर इस दवा का ट्रायल किया गया, उनमें तेजी से रिकवरी देखी गई। यही नहीं, ऐसे मरीजों की आक्सीजन पर निर्भरता भी कम हो गई। डीआरडीओ के विज्ञानियों के अनुसार यह दवा अस्पताल में भर्ती मरीजों को तेजी से ठीक होने में मदद करने के साथ-साथ अतिरिक्त आक्सीजन की निर्भरता को भी कम करती है। इसकी पुष्टि दवा के तीसरे चरण के ट्रायल में हुई है, जिसके अच्छे नतीजे आए हैं, उसी के बाद इसके इस्तेमाल की स्वीकृति दी गई है।

विज्ञानियों के अनुसार वायरस के विकास के लिए ग्लूकोज का होना जरूरी है और अगर कोरोना वायरस को शरीर में ग्लूकोज नहीं मिलेगा तो उसकी वृद्धि रुक जाएगी। संक्रमित कोशिकाओं में जमा हो जाने के

बाद डीआरडीओ द्वारा विकसित नई दवा वायरल संश्लेषण तथा ऊर्जा उत्पादन कर वायरस को और बढ़ने से रोकती है। संक्रमित कोशिका के साथ मिलकर यह एक प्रकार से सुरक्षा दीवार बना देती है, जिससे वायरस उस कोशिका के साथ ही अन्य हिस्सों में भी नहीं फैल सकेगा। डीआरडीओ के विज्ञानियों का कहना है कि किसी भी टिशू या वायरस के विकास के लिए ग्लूकोज जरूरी होता है, लेकिन अगर उसे ग्लूकोज नहीं मिले तो उसके मरने की उम्मीद बढ़ जाती है, इसी को मिमिक करके ग्लूकोज का एनालॉग बनाया गया।

इसे विकसित करने वाले विज्ञानियों के मुताबिक वायरस कोशिका से चिपकी इस दवा को ग्लूकोज समझकर खाने की कोशिश करेगा, लेकिन चूंकि यह कोई ग्लूकोज नहीं है, इसलिए इस दवा को खाने से कोरोना वायरस की मौत हो जाएगी और मरीज ठीक होने लगेगा, यही इस दवाई का मूल सिद्धांत है। इस दवा से आक्सीजन की शरीर में कमी नहीं होगी और जिन मरीजों को आक्सीजन की जरूरत है, उन्हें भी इस दवा को देने के बाद संक्रमण की आशंका कम होगी। अप्रैल 2020 से मार्च 2021 के बीच इस दवा के तीन चरण के क्लीनिकल ट्रायल हो चुके हैं और इनके काफी सुखद परिणाम सामने आए हैं। दवा के पहले चरण का ट्रायल अप्रैल-मई 2020 में पूरा हुआ था, जिसमें लैब में ही दवा पर परीक्षण किए गए थे।

केंद्रीय औषधि मानक नियंत्रण संगठन (सीडीएससीओ) को डीसीजीआइ की मंजूरी के बाद दूसरे चरण के क्लीनिकल ट्रायल मई 2020 से अक्टूबर 2020 के बीच हुए और क्लीनिकल ट्रायल में देशभर के 11 विभिन्न अस्पतालों में भर्ती कुल 110 मरीजों को शामिल किया गया। बहरहाल डीसीजीआइ के मुताबिक 2-डीजी दवा के प्रयोग से कोरोना वायरस के ग्रोथ पर प्रभावी नियंत्रण से अस्पताल में भर्ती कोरोना मरीजों के स्वास्थ्य में तेजी से रिकवरी हुई है। चूंकि रक्षा मंत्रालय के मुताबिक इस दवा का उत्पादन बहुत जल्द और भारी मात्रा में देश में ही किया जाना संभव है, इसलिए कोरोना संक्रमितों के इलाज में दवा की कमी की कोई समस्या आने की संभावना नहीं रहेगी, इससे कोरोना के मरीजों को बड़ी राहत मिलेगी। डीआरडीओ की कोशिश है कि यह दवा देश के प्रत्येक नागरिक को और हर स्थान पर आसानी से उपलब्ध हो सके। उम्मीद है कि अगले माह से यह गेमचेंजर दवा लागत मूल्य पर ही कोविड संक्रमित मरीजों के इलाज के लिए बाजार में उपलब्ध हो जाएगी। (स्वतंत्र पत्रकार)

<https://www.jagran.com/editorial/apnibaat-drdo-2dg-medicine-for-treating-covid-19-patients-jagran-special-21645580.html>

DRDO developed 2-DG drug could be game-changer, Says Minister Dr K Sudhakar

Bengaluru: The 2-DG drug developed by the Defence Research and Development Organisation (DRDO) could be a game-changer in the fight against Covid, Karnataka Health Minister Dr K Sudhakar said on Friday.

"The 2-DG drug developed by DRDO is a big breakthrough and could be a game-changer in the battle against pandemic as it helps in faster recovery of hospitalised patients and reduces oxygen dependence," Sudhakar was quoted as saying in a statement issued by his office.

The Minister had visited the DRDO campus in the city where scientists briefed him about the ongoing efforts at the premier research organisation to find solutions to tackle the pandemic.

About the 2-DG (2-deoxy-D-glucose), an anti-Covid-19 therapeutic application of the drug, the statement read that it has been developed by the Institute of Nuclear Medicine and Allied Sciences (INMAS), a lab of Defence Research and Development Organisation (DRDO), in collaboration with Dr Reddys Laboratories (DRL), Hyderabad.

Clinical trial results have shown that this molecule helps in faster recovery of hospitalised patients and reduces supplemental oxygen dependence.

Higher proportion of patients treated with 2-DG showed RT-PCR negative conversion in Covid patients. The drug would be of benefit to the people suffering from Covid-19, the statement read.

In April 2020, during the first wave of the pandemic, INMAS-DRDO scientists conducted laboratory experiments with the help of Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and found that this molecule works effectively against SARS-CoV-2 virus and inhibits the viral growth, according to the statement.

It said based on these results, the Drugs Controller General of India (DCGI) Central Drugs Standard Control Organisation (CDSCO) permitted Phase-II clinical trial of 2-DG in Covid-19 patients in May 2020.

The DRDO, along with its industry partner DRL, Hyderabad, started the clinical trials to test the safety and efficacy of the drug in Covid-19 patients.

In Phase-II trials (including dose ranging) conducted during May-October 2020, the drug was found to be safe in COVID-19 patients and showed significant improvement in their recovery, the statement said adding, Phase-II was conducted in six hospitals and Phase IIb (dose ranging) clinical trial was conducted at 11 hospitals all over the country.

Phase-II trial was conducted on 110 patients.

Another innovative solution of DRDO - the Oxycare System - optimises the consumption of oxygen and reduces the workload and exposure of healthcare providers by eliminating the need of routine measurement and manual adjustments of oxygen flow, he added.

According to the Minister, the PM-CARES Fund would procure 1.5 lakh units of Oxycare System at a cost of Rs 322.5 crore.

<https://timesofindia.indiatimes.com/city/bengaluru/drdo-developed-2-dg-drug-could-be-game-changer-says-minister-dr-k-sudhakar/articleshow/82632026.cms>



"The 2-DG drug developed by DRDO is a big breakthrough and could be a game-changer in the battle against pandemic as it helps in faster recovery of hospitalized patients and reduces oxygen dependence," Dr K Sudhakar was quoted as saying in a statement issued by his office.

Sun, 16 May 2021

Hyderabad: 2-DG sachets at ESIC for clinical trials

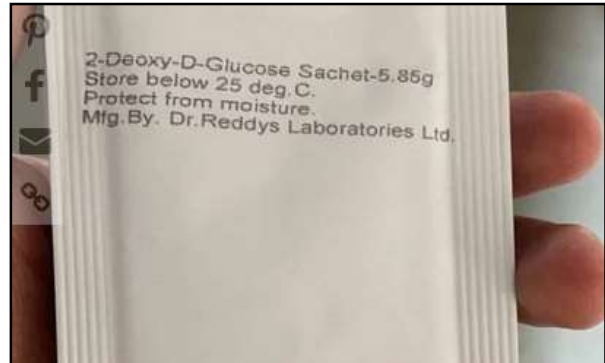
Highlights

The first batch of about 10,000 doses of 2-deoxy-D glucose (2-DG) drug for treatment of moderate to severe Covid-19 cases is likely to be launched next week.

Hyderabad: The first batch of about 10,000 doses of 2-deoxy-D glucose (2-DG) drug for treatment of moderate to severe Covid-19 cases is likely to be launched next week. Meanwhile, the DRDO has issued 50 sachets of this oral medicine for clinical trials on patients at ESIC hospital, Sanathnagar in Hyderabad.

According to a letter signed by M Balasubramanyam, PRO to Director-General MSS and staff officer, Chairman DRDO, five sachets are to be used per person based on the body weight of the patient.

The required quantity (45 mg per kg of body weight) is to be dissolved in 100 ml of water. It also said one pouch should be dissolved in the water and half of it should be given in the morning and the balance half in the evening about 30 minutes before mealtime. The five pouches are to be used in five days. The ESIC has been asked to submit a report on the findings of use of the medicine to DRDO at the earliest.



<https://www.thehansindia.com/news/cities/hyderabad/hyderabad-2-dg-sachets-at-esic-for-clinical-trials-686432?infinitescroll=1>



Sat, 15 May 2021

Bengaluru: DRDO Scientists developing 2-DG drug in battle against Covid pandemic

Bengaluru: Close on the heels of the news about India's premier science institute, the Indian Institute of Science (IISc), Bengaluru developing a very efficient vaccine against the Covid pandemic, comes news from another central facility Defence Research Development Organisation (DRDO) campus in Bengaluru developing a 2-DG drug that promises to help in the faster recovery of hospitalized Covid patients and reduces their oxygen dependence.

Karnataka's health and family welfare as well as medical education minister Dr K Sudhakar, who visited the IISc, Bengaluru and interacted with its director Prof Govindan Rangarajan on Thursday, paid a visit to the DRDO campus in the city and interacted with its scientists on Friday to learn about the development of the 2-DG drug, which he said could be a game-changer in the battle against the pandemic.

"The 2-DG drug developed by DRDO is a big breakthrough and could be a game-changer in the battle against pandemic as it helps in faster recovery of hospitalised patients and reduces oxygen dependence," Dr Sudhakar said.

PM-CARES Fund will procure 1.5 lac units of Oxycare System at a cost of Rs 322.5 crore, he said.

Dr Sudhakar said another innovative solution, the Oxycare System, reduces the workload and exposure of healthcare providers by eliminating the need of routine measurement and manual adjustments of oxygen flow.

2-DG drug, a game-changer

An anti-COVID-19 therapeutic application of the drug 2-deoxy-D-glucose (2-DG) has been developed by Institute of Nuclear Medicine and Allied Sciences (INMAS), a lab of Defence Research and Development Organisation (DRDO), in collaboration with Dr Reddy's Laboratories (DRL), Hyderabad.

Clinical trial results have shown that this molecule helps in faster recovery of hospitalised patients and reduces supplemental oxygen dependence.

A higher proportion of patients treated with 2-DG showed RT-PCR negative conversion in Covid patients. The drug will be of immense benefit to the people suffering from Covid-19, the DRDO scientists told the minister.

Pursuing Prime Minister Narendra Modi's call for preparedness against the pandemic, DRDO took the initiative of developing an anti-Covid therapeutic application of 2-DG.

In April 2020, during the first wave of the pandemic, INMAS-DRDO scientists conducted laboratory experiments with the help of Centre for Cellular and Molecular Biology (CCMB), Hyderabad and found that this molecule works effectively against SARS-CoV-2 virus and inhibits the viral growth.

Clinical trials, approvals

Based on these results, the Drugs Controller General of India's (DCGI) Central Drugs Standard Control Organization (CDSCO) permitted a Phase-II clinical trial of 2-DG in COVID-19 patients in May 2020.

The DRDO, along with its industry partner DRL, Hyderabad, started clinical trials to test the safety and efficacy of the drug in COVID-19 patients.

In Phase-II trials (including dose-ranging) conducted from May to October 2020, the drug was found to be safe in Covid-19 patients and showed significant improvement in their recovery. Phase-IIa trial was conducted in six hospitals and Phase-IIb (dose-ranging) clinical trial was conducted at 11 hospitals all over the country. Phase-II trial was conducted on 110 patients.

In the efficacy trends, the patients treated with 2-DG showed faster symptomatic cure than Standard of Care (SoC) on various endpoints.

A significantly favourable trend (2.5 days difference) was seen in terms of the median time to achieving normalisation of specific vital signs parameters when compared to SoC.

Based on successful results, DCGI further permitted the Phase-III clinical trials in November 2020.

The Phase-III clinical trial was conducted on 220 patients between December 2020 to March 2021 at 27 Covid hospitals in Delhi, Uttar Pradesh, West Bengal, Gujarat, Rajasthan, Maharashtra, Andhra Pradesh, Telangana, Karnataka and Tamil Nadu, Dr Sudhakar said quoting information from DRDO scientists.

The detailed data of the phase-III clinical trial was presented to DCGI. In the 2-DG arm, a significantly higher proportion of patients improved symptomatically and became free from supplemental oxygen dependence (42% vs 31%) by Day-3 in comparison to SoC, indicating an early relief from oxygen therapy/dependence. A similar trend was observed in patients aged more than 65 years.

On May 1, 2021, DCGI granted permission for the emergency use of this drug as an adjunct therapy in moderate to severe Covid-19 patients.

"Being a generic molecule and analogue of glucose, it can be easily produced and made available in plenty in the country," DRDO scientists said.

The drug comes in powder form in sachets, which is taken orally by dissolving it in water. It accumulates in the virus-infected cells and prevents virus growth by stopping viral synthesis and energy production. Its selective accumulation in virally infected cells makes this drug unique.

In the ongoing second Covid-19 wave, a large number of patients are facing severe oxygen dependency and need hospitalization, the minister mentioned.

The drug is expected to save precious lives due to the mechanism of operation of the drug in infected cells. This also reduces the hospital stay of Covid-19 patients.

Oxycare System, a smart solution

Oxycare System is a comprehensive system developed by DRDO to regulate oxygen being administered to patients based on the sensed values of their SpO2 levels. The system has been developed in two configurations.

The basic version consists of a 10-litre oxygen cylinder, a pressure regulator cum flow controller, a humidifier and a nasal cannula.

The oxygen flow is regulated manually based on the SpO2 readings. The intelligent configuration includes a system for automatic regulation of oxygen through a low pressure regulator, electronic control system and a SpO2 probe in addition to the basic version.

SpO2-based oxygen control system optimises the consumption of oxygen based on the SpO2 level of the patient and effectively increases the endurance of the portable oxygen cylinder.

The threshold SpO2 value for initiating flow from the system can be adjusted by the health staff and the SpO2 levels are continuously monitored and displayed by the system.

It reduces the workload and exposure of healthcare providers by eliminating the need for routine measurement and manual adjustments of Oxygen flow, thereby facilitating teleconsultation also.

The automatic system also provides a suitable audio warning for various failure scenarios including low SpO2 values and probe disconnections.

These Oxycare Systems can be used at homes, quarantine centres, Covid Care Centres and hospitals, according to DRDO scientists.

In addition, Non-Rebreather Masks (NRM) are integrated with the Oxycare Systems for efficient use of oxygen which results in saving oxygen by 30-40%.

DRDO has transferred the technology to multiple industries in India that will be producing the Oxycare Systems for use all across India.

The current medical protocol recommends oxygen therapy for all severe and critical Covid-19 patients. Given the current status of oxygen generation, transport and storage, oxygen cylinders have proved to be effective.

Considering the present Covid pandemic situation with a large number of individuals requiring oxygen therapy, sourcing only one type of system may not be practical, as all the manufacturing plants making the basic building blocks of the system are already running at their maximum capacity, the minister felt.

A mix and match of the system would prove to be a useful arrangement in the given situation.

While the capacity of existing domestic manufacturers of carbon-manganese steel cylinders is very limited, as an alternative, DRDO has suggested light material portable cylinders which can easily act as substitutes for normal oxygen cylinders.

Minister lauds IISc, DRDO Scientists

PM-CARES Fund has accorded sanction for procurement of 1,50,000 units of Oxycare System at a cost of Rs 322.5 crore.

"Bengaluru is the science and technology capital of India and home to several premier institutes. The efforts of institutes like IISc and DRDO to find innovative and effective solutions to fight this pandemic is laudable. The vaccine developed by IISc which can be stored in warm temperatures and the 2-DG drug and Oxycare System developed by DRDO are game-changers in the battle against Covid-19," said Dr Sudhakar.

<https://daijiworld.com/news/newsDisplay?newsID=833290>

DRDO imports zeolite to make oxygen for COVID-hit

"The two aircraft carrying zeolite from Rome arrived as the first consignment of the key component," a DRDO official told IANS.

Bengaluru: Two Air India cargo aircraft have landed in Bengaluru with 34,200kg of zeolite imported by the Defence Research and Development Organisation (DRDO) to make medical oxygen for treating Covid patients, an official said on Sunday.

"The two aircraft carrying zeolite from Rome arrived as the first consignment of the key component," a DRDO official told IANS.

Zeolites are 'molecular sieves' comprising silicon, aluminium, and oxygen among others and are used as a raw material to make industrial and medical oxygen.

"The component will be used to make medical oxygen at Tata Advance Systems Ltd plant at Malur in Kolar, with the technology developed and transferred by DRDO," said the official, who did not want to be identified.

"Zeolite will be used as a molecular sieve in making purified oxygen in the plant, which adopts pressure swing adsorption technology developed by the DRDO," said the official.

More consignments of the raw material are scheduled to land at the city airport this week from Italy and South Korea to generate oxygen, whose demand shot up exponentially for treating Covid patients amid the pandemic's second wave.

"The technology has been transferred to 5-6 companies for making medical oxygen on priority to meet the growing demand," added the official.

DRDO developed the technology to generate oxygen onboard its fighter aircraft Tejas, which has been inducted by the Indian Air Force.

<https://www.indiatvnews.com/news/india/drdo-imports-zeolite-make-oxygen-covid-hit-coronavirus-pandemic-updates-705074>



DRDO imports zeolite to make oxygen for Covid-hit.
Image Source : PTI/ REPRESENTATIONAL.

Air India ferrying 'Zeolite' for DRDO to boost oxygen production

DRDO placed an order with Air India to bring Zeolite from all over the world

To meet the demand of oxygen supply in the country amidst the COVID-19 pandemic, India's Defence Research and Development Organisation (DRDO) has chartered the National Carrier Air India (AI) to import 'Zeolite' from different countries.

"Government of India is in the process of importing Zeolite from different parts of the world, for use in Pressure Swing Absorption (PSA) plants to boost oxygen supplies in the country. DRDO has been appointed by GOI as a charterer for these consignments. Air India will bring in zeolite for DRDO from different parts of the world," Air India spokesperson told ANI.

According to an expert, Zeolite is a key component in the oxygen production process on a mass scale.



"Zeolite-based oxygen concentrator systems are widely used to produce medical-grade oxygen. The zeolite is used as a molecular sieve to create purified oxygen from air using its ability to trap impurities, in a process involving the adsorption of nitrogen, leaving highly purified oxygen and up to 5 per cent argon," an expert said.

Air India has already flown from Rome with Zeolite and is landing in Bengaluru this evening.

"First of these two flights have taken off from Rome and to land in Bengaluru in the evening. Seven charter flights in all have been scheduled between May 15 to 18," Air India told ANI.

DRDO placed an order with Air India to bring Zeolite from all over the world.

"Air India will be flying in zeolite from Rome in seven flights followed by eight charter flights from Korea to Bangalore, between May 19 to 22. Further, we have uplift from the USA through our existing scheduled flights from EWR between May 20 to 25. Another part of this exercise is from Brussels, Tokyo and again USA, in the following weeks," National Carrier Air India told ANI.

Recently DRDO has set up an oxygen plant in AIIMS and RML hospital which generates 1,000 litres per minute.

Air India has always been playing a pivotal role in India's crusade against Covid right from the first evacuation flights that it operated to Wuhan. From evacuation to transporting medical and essential equipment, vaccines and oxygen concentrators, etc., Air India has been flapping its wings relentlessly at the service of the nation.

(Only the headline and picture of this report may have been reworked by the Business Standard staff; the rest of the content is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/current-affairs/air-india-ferrying-zeolite-for-drdo-to-boost-oxygen-production-121051500416_1.html

ऑक्सीजन की कमी दूर करने के लिए DRDO और एयर इंडिया ने मिलाया हाथ, कई देशों से लाया जा रहा जियोलाइट

By Ashutosh Tiwari

नई दिल्ली: देश में ऑक्सीजन की कमी को दूर करने के लिए रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) भी तेजी से काम कर रहा है। मौजूदा वक्त में केंद्र सरकार ने उसे कई बड़े अस्पतालों और राज्यों में ऑक्सीजन प्लांट लगाने का काम सौंपा है, जिसके लिए बड़ी संख्या में जियोलाइट की जरूरत पड़ेगी। जिसे विदेशों से आयात करना है। इसके लिए अब डीआरडीओ ने नेशनल कैरियर एयर इंडिया से हाथ मिलाया है। दोनों मिलकर जियोलाइट विदेशों से लाने का काम करेंगे।

एयर इंडिया के प्रवक्ता ने न्यूज एजेंसी एएनआई को बताया कि भारत सरकार देश में ऑक्सीजन आपूर्ति को बढ़ाने के लिए जगह-जगह पीएसए प्लांट लगा रही है। जिसके लिए विदेशों से काफी सामान आने हैं, जिसमें जियोलाइट प्रमुख है। मामले की गंभीरता को देखते हुए सरकार ने डीआरडीओ की मदद के लिए एयर इंडिया से कहा है। ऐसे में एयर इंडिया के विमान कई देशों से पीएसए से जुड़े संयंत्रों को लाएंगे।



रवक्ता के मुताबिक एयर इंडिया के दो विमानों ने जियोलाइट के साथ रोम से उड़ान भरी है, जो शनिवार को बेंगलुरु पहुंचेंगे। इन विमानों में 35 टन जियोलाइट है। इसके अलावा 15 से 18 मई के बीच 7 चार्टर उड़ाने शेड्यूल की गई हैं। फिर 19 से 22 मई के बीच कोरिया से 8 चार्टर विमान उड़ान भरेंगे। वहीं एक्सपर्ट के मुताबिक जियोलाइट बड़े पैमाने पर ऑक्सीजन उत्पादन की प्रक्रिया में एक प्रमुख घटक है। इसका उपयोग व्यापक रूप से मेडिकल-ग्रेड ऑक्सीजन का उत्पादन करने के लिए किया जाता है। ये हवा में व्याप्त अशुद्धियां, जैसे नाइट्रोजन आदि को सोख लेता है। इसके बाद शुद्ध ऑक्सीजन का उत्पादन प्लांट द्वारा किया जाता है।

<https://hindi.oneindia.com/news/india/drdo-air-india-flight-for-zeolite-boost-oxygen-production-618033.html>

DRDO to provide devices to regulate oxygen supply for Covid patients

By Niranjan Kaggere

The state government has decided to procure 1,000 'Oxycare Systems' from the city-based Defence Research and Development Organisation (DRDO). The devices will help use oxygen better and stop pilferage.

The Oxycare System has been developed by the Defence Bioengineering and Electromedical Laboratory (DEBEL) and helps in regulating oxygen given to the patient.

"This will enable us to estimate the amount of oxygen required by the patient. These machines can be used at homes, Covid Care Centres and hospitals. Intelligent configuration of the system provides automatic regulation of oxygen supply through a regulator and electronic system, based on the sensed values of oxygen saturation in the patient's body," a health department official explained.

The automatic machine costs Rs 10,000 per unit. The government will procure 900 automatic machines and 100 manual ones.

On Friday, Health and Medical Education Minister Dr K Sudhakar visited the DRDO facility in the city and interacted with scientists about the functioning of the equipment. He also sought their advice on other technology that could help address the pandemic situation.

<https://www.deccanherald.com/city/drdo-to-provide-devices-to-regulate-oxygen-supply-for-covid-patients-986390.html>



Credit: DH Photo

पीएम केयर फंड के पैसे से खरीदा जाएगा डीआरडीओ का 'ऑक्सी-केयर' सिस्टम, ऐसे करता है काम

डीआरडीओ के अनुसार इन दोनों वर्जन की टेक्नलॉजी कई कंपनियों को दिया गया है। ये कंपनियां ऑक्सी-केयर का निर्माण करेंगी।

By नीरज राजपूत

नई दिल्ली: कोरोना काल में ऑक्सजीन के लिए मची हाहाकार के बीच पीएम-केयर फंड से डीआरडीओ के डेढ़ (1.50) लाख 'ऑक्सी-केयर' सिस्टम खरीदने का फैसला किया गया है। एसपीओटू सिस्टम पर आधारित इन स्वदेशी सिस्टम्स की कुल कीमत करीब 322.50 करोड़ है। रक्षा मंत्रालय के मुताबिक, इस ऑक्सी-केयर सिस्टम को डिफेंस रिसर्च एंड डेवलपमेंट ऑर्गेनाइजेशन (डीआरडीओ) के कुछ साल पहले हाई-ऑल्टिट्यूड क्षेत्रों में तैनात सैनिकों के लिए किया गया था।

डीआरडीओ की बंगलुरु स्थित डिफेंस बायो-इंजीनियरिंग एंड इलेक्ट्रो मेडिकल लैबोरेटरी (डीईबीईएल) ने इस सिस्टम को डेवलेप किया था, जो मरीज की एसपीओटू लेबल भांपकर उसे उसी अनुसार ऑक्सीजन सप्लाई करती है। रक्षा मंत्रालय का दावा है कि ये ऑक्सीकेयर कोरोना से ग्रस्त मरीजों के इलाज के लिए कारगर साबित होगा।

रक्षा मंत्रालय ने बयान जारी कर बताया कि ये ऑक्सीकेयर दो वर्जन में उपलब्ध है। ऑटोमैटिक वर्जन में ऑक्सीजन सिलेंडर में इलेक्ट्रोल-कंट्रोल मौजूद है जो एसपीओटू और ऑटोमैटिक रेगुलेटर से मरीज की ऑक्सीजन जान लेता है। इसका फायदा ये होता है कि मरीज को उसकी ऑक्सीजन लेवल (कम है या ज्यादा) उसके अनुसार ही ऑक्सीकेयर ऑक्सीजन सप्लाई करता है। इससे एक सिलेंडर में कम से कम 35-40 प्रतिशत ऑक्सीजन की बचत होती है।

ऑक्सी-केयर के बेसिक वर्जन में एक 10 लीटर के सिलेंडर में प्रेशर रेगुलेटर-युक्त फ्लो-कंट्रोलर, एक ह्यूमिडिफाइर और एक नेसल-कैनुला होता है। इसमें एसपीओटू रिडिंग के अनुसार ऑक्सजीन की सप्लाई मरीज को दी जाती है।

डीआरडीओ के मुताबिक, इन दोनों वर्जन्स की टेक्नोलॉजी कई कंपनियों को ट्रांसफर कर दी गई है, जो अब इन ऑक्सी-केयर का निर्माण करेंगी। पीएम-केयर फंड से कुल एक लाख ऑटोमैटिक ऑक्सीकेयर और 50 हजार बेसिक ऑक्सीकेयर का ऑर्डर दिया गया है।

<https://www.abplive.com/news/india/1-50-lacs-spo2-oxycare-systems-of-drdo-to-be-procured-from-pm-cares-fund-ann-1914568>



ऑक्सीजन सिलेंडर (फाइल फोटो)

डीआरडीओ का अस्पताल 25 मई तक शुरू होने की उम्मीद

डीआरडीओ के अनुसार इन दोनों वर्जन की टेक्नलॉजी कई कंपनियों को दिया गया है। ये कंपनियां ऑक्सी-केयर का निर्माण करेंगी।

By नीरज राजपूत

हल्द्वानी: राजकीय मेडिकल कॉलेज में पांच सौ बेड के फैब्रिकेटेड अस्पताल का निर्माण तेजी से चल रहा है। अस्पताल के 25 मई तक संचालित होने की संभावना है। एसटीएच में एक हजार एलपीएम (लीटर प्रति मिनट) का ऑक्सीजन प्लांट भी 65 लाख की लागत से लग रहा है।

डीआरडीओ की ओर से मेडिकल कॉलेज में पांच सौ बेड का फैब्रिकेटेड अस्पताल बनाया जा रहा है। अस्पताल के निर्माण का काम तेजी से चल रहा है। सीडीओ नरेंद्र सिंह भंडारी ने बताया कि अस्पताल में प्रशासन से जुड़े विभागों ने अपना काम पूरा कर दिया है। डीआरडीओ का टैंक आना है। डीआरडीओ के अधिकारियों ने 25 मई तक अस्पताल शुरू होने की संभावना जताई है। दूसरी ओर राजकीय मेडिकल कॉलेज के प्राचार्य डॉ. सीपी भैसोड़ा ने बताया कि अस्पताल के लिए सौ नर्सों को रखा जाएगा। कहा कि नियुक्तियों के लिए कई बार विज्ञापन प्रकाशित किया है मगर डॉक्टर नहीं मिल रहे हैं। अस्पताल में एसटीएच के डॉक्टरों को ही लगाया जाएगा। एसटीएच में ऑक्सीजन जेनरेशन प्लांट लगाने का काम शुरू हो गया है।

महिला अस्पताल में बनेगा ऑक्सीजन जेनरेशन प्लांट

हल्द्वानी। महिला अस्पताल में ऑक्सीजन जेनरेशन प्लांट लगाने की योजना है। सीडीओ नरेंद्र सिंह भंडारी ने बताया कि 150 एलपीएम (लीटर प्रति मिनट) का प्लांट बनेगा। इससे 20 से 25 ऑक्सीजन गैस सिलिंडर मिल जाएंगे। साथ ही ऑक्सीजन गैस सिलिंडर बैकअप में रखी जाएंगे। प्लांट का काम जल्द शुरू कराया जाएगा।

<https://www.amarujala.com/uttarakhand/nainital/drdo-hospital-expected-to-start-by-may-25-haldwani-news-hld4245705190>

Telangana: Rachakonda police launch oxygen cylinder bank for Covid-19 patients

The initiative, christened, Praana Vayu Seva, lets a citizen in need of oxygen cylinders obtain one without hassles

Hyderabad: Rachakonda police in Telangana, along with the Rachakonda Security Council, launched an Oxygen Cylinder Bank on Saturday. The initiative, christened, Praana Vayu Seva, lets a citizen in need of oxygen cylinders obtain one without hassles.

Launching the program, Police Commissioner Mahesh Bhagwat said anyone in need can call Rachakonda Covid Control Room at 9490617234 and fill in the request form, duly upload the supporting documents, and obtain the cylinder for a limited period. The oxygen cylinders are sponsored by the Defence Research Development Organisation (DRDO), Lions Club, Hetch Foundation, Second Chance Foundation.

The police also launched a web portal for plasma donors and appealed to the citizens to call up the Covid control room at 9490617234 and avail the services being provided by Rachakonda police.

According to him, about 70 percent of the requests received at the Covid control room are regarding plasma requirements. As convalescent plasma therapy is widely prescribed by doctors for the treatment of the Covid 19 patients, there is a huge demand for plasma. “While Rachakonda Police is trying to reach out to whomever possible, the huge demand can be met only if more donors come forward,” he said.

The webpage (<https://donateplasma.rksc.org.in/>) developed in association with Rachakonda Security Council lets donors, as well as those in need of plasma, register themselves. The Rachakonda Covid Control Room and volunteers of RKSC will match the donor with the request and address the need. The CP stressed that a person who recovered from COVID can donate plasma every 15 days and 400 ml of plasma from one such donor can save two lives. So far, 77 personnel of Rachakonda Police have donated plasma to those in need.

<https://indianexpress.com/article/cities/hyderabad/telangana-rachakonda-police-launch-oxygen-cylinder-bank-for-covid-19-patients-7317008/>

LG visits GMC Jammu, reviews COVID management measures

Jammu: Jammu and Kashmir Lt Governor Manoj Sinha on Sunday visited Government Medical College (GMC) hospital here and directed the management to operationalise the additional 100-bedded COVID ward at the earliest, an official spokesman said.

Sinha visited the GMC to review COVID clinical management measures being undertaken by the hospital administration, he said.

While reviewing the progress being made for establishing an additional 100-bedded COVID ward, the Lt Governor directed the principal and senior doctors of the GMC Jammu to ensure the operationalisation of the facility at the earliest.

He also enquired about COVID care facilities, availability of oxygen support beds, functionality of oxygen generation plants, besides compliance of earlier directions including regular rounds of HoDs and senior doctors in the wards to examine the patients, the spokesman said.

Emphasising on strengthening the healthcare workforce, Sinha directed for hiring additional paramedical staff, besides rational utilisation of existing resources to ensure effective patient care management.

He stressed on optimised supportive care for coronavirus patients and round the clock care by the hospital staff, the spokesman said.

Principal GMC Shashi Sudhan Sharma informed the Lt Governor that as many as 250 nurses would join the facility within three days, substantially adding to the available healthcare workforce.

Earlier, the Lt Governor visited Defence Research and Development Organisation's (DRDO) 500-bedded under construction COVID hospital site at Bhagwati Nagar here and took first-hand appraisal of the on-going work.

The fully air-conditioned make-shift facility with 125 ICU beds and ventilators will be completed by May 25, the spokesman said.

While inquiring about the patient-care facilities to be made available at the said COVID care hospital, the Lt Governor was informed by the officers of DRDO about installation of oxygen generation plant, triage facility, availability of doctors, paramedics and other important aspects of the COVID care management.

The Lt Governor directed the health department to provide all support to DRDO, including arrangements of health related facilities, hiring and posting of doctors, paramedics, and other healthcare workforce well before the formal functioning of the hospital, the spokesman said.

Liquid medical oxygen (LMO) tanks with a capacity of 40 metric tonnes (2 tanks of 20 metric tonnes each) would be installed in this COVID care facility, besides the whole structure is prefabricated and fire retardant, he said.

The DRDO is setting up a 500-bedded COVID facility, one each in Srinagar and Jammu, which will substantially increase the COVID dedicated bed availability in J-K, the spokesman said.

(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)

<https://www.outlookindia.com/newscroll/lg-visits-gmc-jammu-reviews-covid-management-measures/2084236>

DRDO stops construction of 500-bed Corona hospital in Budgam after adverse feasibility report

To be established in Khomoh in existing building

By Suhail Bhat

Srinagar: Nearly 10 days after the Defence Research and Development Organization (DRDO) started construction of 500-bed COVID-19 hospital in Central Kashmir Budgam district, the work on the project has been stopped as the Government is trying to save construction time by shifting the hospital to an available structure on the outskirts of Srinagar.

The decision to set up the facility in Valley had come when hospitals in the Valley were running on 100 percent occupancy. The hospital is believed to ramp up the medical infrastructure by adding nearly 125 fully equipped ICU beds for COVID patients and 50-double room accommodation facility for doctors and paramedic staff. The shifting of the hospital, however, has prolonged the completion of the makeshift COVID hospital which was supposed to get completed “on a war footing in a shortest possible time” and before May 31.

In view of the rising COVID-19 cases, the Defense Research and Development organization in association with the Jammu and Kashmir Government started construction of two 500-bed COVID-19 hospitals. In Valley, the administration handed over land in Reshipora village of Budgam in the outskirts of Srinagar, which was already identified for a hospital.

Deputy Commissioner Budgam, Shahbaz Mirza said the site was not feasible for the construction. “The area survey and Tree cutting at the site started on May 2 and they did a soil investigation on May 3. Due to poor soil condition and marshy land, it was difficult to construct the makeshift hospital in the timelines as it required major time-consuming efforts for the construction of foundation etc,” he said.

He added that hospital is a makeshift facility for the entire Valley. “It is not a permanent hospital and its shifting from a place should not be taken as a step amounting to depriving the district of any permanent health facility,” he said.

He also said that the Government is building a permanent facility for the people at the site. “We will use the land for construction of a new building for District hospital, when it is sanctioned. We already submitted a DPR for the same to the Government for the consideration,” he said.

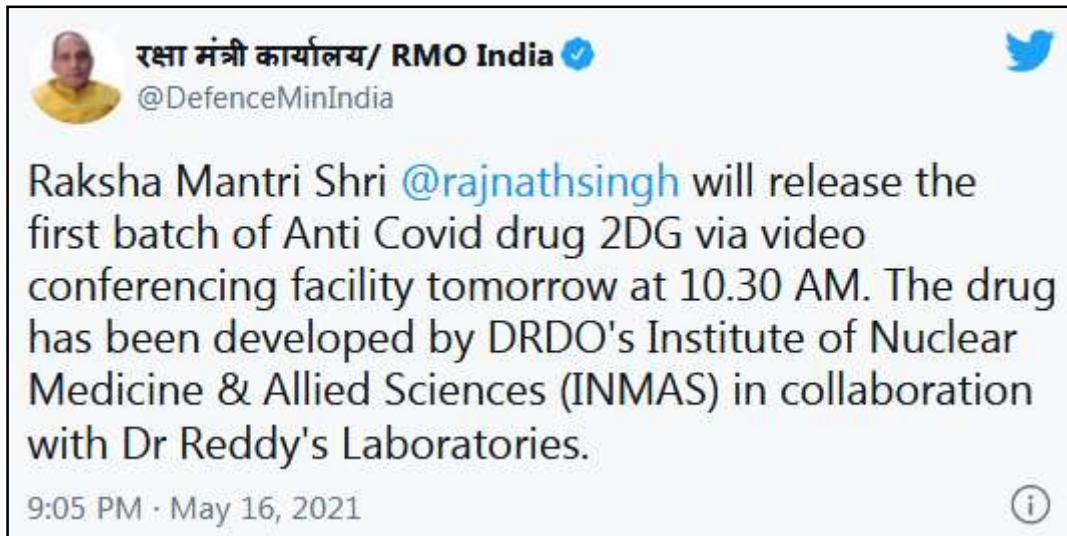
An official, however, said that another major reason behind the shifting of the hospital is the availability of infrastructure in the Khonmoh area on the city outskirts. “We had no time to set up a structure. We are moving the hospital to existing infrastructure. Our intention is to save the construction time and make the hospital functional as soon as possible. There is no other reason behind the move”, he said.

J&K Anjuman Sharie Shian stated that Budgam, has faced immense development crisis, with most of its sectors remaining unexplored. “Khonmoh is a catchment area for AIIMS, Awantipora. There is a need to rethink as far establishing health institutions are concerned. You have medical colleges in the south, north, tertiary care healthcare in Srinagar. Budgam deserves its share,” a statement read.

Chairperson, DDC Budgam, Nazir Ahmad Khan has also written a letter to Lieutenant Governor, Manoj Sinha, demanding his intervention regarding the issue. “I urge the authorities to revoke the decision as the existing site is located at an ideal place with a railway station and airport nearby. The shifting of the hospital is unjust,” he told Excelsior. He, however, added that authorities have assured him they will use the site for the construction of the district hospital.

<https://www.dailyexcelsior.com/drdo-stops-construction-of-500-bed-corona-hospital-in-budgam-after-adverse-feasibility-report/>

DRDO on Twitter



The Tribune

Mon, 17 May 2021

Army to procure 50,000 bulletproof Jackets for its frontline troops

Procurement process expected to commence in next couple of months

By Vijay Mohan

Chandigarh: The Indian Army has projected a requirement of 50,000 new bulletproof jackets (BPJs) for its frontline troops, the procurement process for which is expected to commence in the next couple of months.

The Ministry of Defence is expected to issue a request for proposal to vendors in June and the procurement would be done in phases over a 12 to 24 month period after all the modalities have been finalised and user trials concluded.

The specifications listed by the Army state that the BPJs should be able to protect a soldier against 7.62 mm armour piercing rifle ammunition as well as hard steel core bullets fired from a distance of 10 metre.

The BPJs required for protection against armour piercing ammunition, whose velocity is higher than that of other bullets, should weigh less than 10 kg, while the weight of those meant for use against steel core rounds should not exceed 8 kg.

The jacket's outer tactical vest should have the capacity to carry three magazines of the newly inducted SIG 716 rifle and the proposed AK-203 assault rifle along with other items like hand grenades, hand-held radio sets, tools, or attach additional pouches.

Shortage of bulletproof jackets has been dodging the army for many years and in the past, the procurement process as well as trials have generated controversy pertaining to the source as well as the quality.

In 2009, there was a shortage of 3,53,755 BPJs and procurement was not done for a long time. A contract for procurement of 1,86,138 BPJs, through the capital route, was concluded with a private firm in April, 2018. In February 2021, Minister of State for Defence, Shripad Naik, informed Parliament that out of the aforementioned order, 1,00,000 BPJs have been received so far.

Some Indian firms are also producing BPJs for the armed forces as well as the police. Last month, the Defence Research and Development Organisation claimed to have developed a lightweight BPJ, weighing about 9 kg that met the qualitative requirements of the Indian Army.

<https://www.tribuneindia.com/news/nation/army-to-procure-50-000-bulletproof-jackets-for-its-frontline-troops-253773>



Photo for representation. PTI

India set to resurrect '101 Squadron' at Hashimara base with 4 more Rafale jets

At the end of May, the Air Force will have 24 Rafale fighter jets in India, with another seven kept for training purposes in France and only five more to be handed over before the two squadrons are complete

By Shishir Gupta

With another batch of four Rafale fighters landing at Ambala from Merignac-Bordeaux airbase in France on May 19-20, the Indian Air Force (IAF) is all set to resurrect the 101 “Falcons of Chamb” squadron at Hashimara in West Bengal even as advance units have already moved into the new base.

While the exact date of Rafale landing in India will be determined by availability of mid-air refuellers of the UAE Air Force and weather conditions, it is quite evident that the full deliveries of 36 aircraft will be completed well before April 2022 as announced by Union defence minister Rajnath Singh in Parliament. At the end of May, the IAF will have 24 Rafale fighter jets in India, with another seven kept for training purposes in France and only five more to be handed over before the two squadrons are complete.

The last five aircraft may be delivered in the second-half of 2021 as Egypt has placed an order of 30 Rafale fighters.

The home base of second squadron is getting readied at Hashimara with repaved extended runways, ammunition depots, blast pens and personnel accommodation apart from maintenance bays. “The Hashimara air base has been totally revamped and should be operational by end of this month. This will be the peace time location of the aircraft but in war times, the fighters will operate from anywhere in the country as per war plans,” said an Air Marshal.

With India likely to buy more front-line fighters to complete the stalled requirement of 126 medium multi-role combat aircraft (MMRCA), the French have not only offered hot engine technology to India but are also willing to jointly develop extended range and capability Hammer air-to-ground missile under the Atmanirbhar Bharat route. French engine manufacturer Safran has already conveyed the offer for jointly developing aircraft engines upto 100 Kilo Newton thrust as well as share the hot engine technology which Indian allies in the west are reluctant to share.

France has also offered to share and jointly develop technology for longer range and heavier Highly Agile and Manoeuvrable Munition Extended Range (Hammer) missile which is currently part of the weapons package on the Indian Rafale. With a range of over 70 kilometres, the Hammer weapon can be guided on to the target using GPS, Inertial Navigation and Infra-red seeker with the capability to adjust to target location mid-air using maps for course correction. The latest version of this weapon has a 1,000 kilogram bomb and with laser guidance technology.

“The Rafale package is a game-changer in the region as none of India’s adversaries have such capability to wage war beyond visual range,” said an IAF Air Marshal.

India ordered 36 warplanes from France (equivalent of two squadrons) in 2016 for ₹59,000 crore under a government-to-government deal.

<https://www.hindustantimes.com/india-news/india-set-to-resurrect-101-squadron-at-hashimara-base-with-4-more-rafale-jets-101621046121678.html>



The last five aircraft may be delivered to India in the second-half of 2021 as Egypt has placed an order of 30 Rafale fighter jets. (File photo)

Despite Covid, 100+ IAF personnel are in Russia on S-400 missile training as delivery nears

The delivery of the S-400 missile system was originally scheduled to begin in 2020, but the deadline was extended after payments to Moscow were delayed

By Snehesh Alex Philip, Edited By Arun Prashanth

New Delhi: Over 100 personnel of the Indian Air Force (IAF) are being trained on the S-400 Triumf Air Defence System in Russia, as both countries eye delivery of the system by the end of this year, ThePrint has learnt.

The S-400 system meant for India is already under production in Russia and is undergoing various trials, sources in the defence and security establishment said.

The trials include high dust and extreme weather withstanding capabilities to suit the Indian demands of operating in the plains, deserts and mountainous terrain.

Sources said the team of over 100 personnel had reached Russia earlier this year and are being trained by a joint team from the Russian military and Almaz Antey, the manufacturers of the system that will become the mainstay of India's air defence.



File image of Russia's S-400 Triumf multi-layered air defence system | Photo: Snehesh Alex Philip | ThePrint

Despite US threats of sanction, India had in 2018 ordered five of the S-400 systems.

In March this year, visiting US Defence Secretary Lloyd Austin had raised the issue of India's planned procurement of the S-400 and stressed that allies and partners should avoid "any kind of acquisitions that will trigger sanctions".

The Modi government had, however, firmly explained that the country's armed forces have a diversified portfolio.

The S-400 capabilities

The S-400 is capable of destroying incoming hostile aircraft, missiles and even drones from a minimum range of 2 km to upto 400 km. It also has a tracking capability of nearly 600 km.

While the delivery of the system was to start in 2020, the payment could only be done in 2019 as US sanctions against Russia made it difficult.

ThePrint had in August last year reported that the delivery will begin only by 2021-end as the contract said, it would be done 24 months from the date of the first payment.

Sources had then said that the production process of each system involves a lot of computing and coding, which is very specific to the requirements of a particular customer.

Each S-400 system, known as a battery, consists of long-range radar, a command post vehicle, target acquisition radar and two battalions of launchers (each battalion has eight). Each launcher has four tubes.

Each component of the system — command post, the radars, and the launchers — is mounted on multi-axle, multi-wheel Ural carriers that have the capability to move on uneven terrains.

This capability makes the batteries difficult to detect because they can keep changing locations, besides expanding the missile engagement zone (MEZ).

Among best defence systems

The S-400 can be armed with four different types of missiles with ranges of 400 km, 250 km, 120 km and 40 km.

The specialised radar can track more than 100 flying objects simultaneously while being able to engage a dozen targets in one go.

Considered to be one of the best air defence systems in the world, the S-400 can cover a height of up to 30 km and the minimum height of detection is 5 km.

The only other country in the region to have the S-400 is China, which, however, has the S-300, the earlier version.

The S-400 has a firing rate that is 2.5 times faster than that of the earlier generation. Incidentally, the Russians have also developed the S-500, the latest version but they've kept it for themselves.

<https://theprint.in/defence/despite-covid-100-iaf-personnel-are-in-russia-on-s-400-missile-training-as-delivery-nears/658533/>



Sun, 16 May 2021

UK universities' research with Chinese military a growing concern for India

One of the fields that will be a serious concern for India is hypersonic technology. In a military context this is one of the keys to naval supremacy this century. China is involved in a new arms race in hypersonics, seeking 'massively destabilising' weaponry

By Radomir Tylecote & Robert Clark

London: Chinese military conglomerates and military-linked elite universities are sponsoring research centres in UK universities and their outputs are increasingly a concern for UK national security. This was the subject of our recent report for British think tank Civitas.

While we do not allege that any UK university or researcher is knowingly contributing to China's military development, the centres' sponsors include China's main ICBM manufacturer and even nuclear warhead developer. Many of the centres' outputs explicitly state potential defence use.

None of this represents an intentional UK strategy, but actually the lack of one. Universities have been encouraged to see themselves as international businesses and have apparently become indiscriminate in their choice of research sponsors. The British media and public have been just as shocked by our revelations as many in India will be. The House of Commons Foreign Affairs Committee is investigating.



One of the fields that will be a serious concern for India is hypersonic technology. In a military context this is one of the keys to naval supremacy this century. China is involved in a new arms race in hypersonics, seeking “massively destabilising” weaponry.

Hypersonic missiles mean those which travel and manoeuvre over five times the speed of sound. They have been called a “revolutionary” weapon which could “strike almost any target in the world within a matter of minutes”. They would give China an inordinate strategic capability, ensuring effective anti-area and access-denial across much of the South China Sea and, increasingly, further west into the Indian Ocean.

Yet while the UK government recently announced its intention to invest billions in hypersonics and other advanced military technologies, the UK's universities may have already spent years inadvertently helping China develop the technology.

Manchester University provided the China Aerospace Science and Technology Corporation (CASC), a conglomerate that develops China's ICBMs, with a research centre subsidised by the UK taxpayer (Manchester says this has closed, but staff are still at the university). One of the centre's recent papers illustrated missiles moving towards the same target. As Juliet Samuel, reporting on our paper for the Telegraph described, the paper "offers one way to solve the 'cooperative simultaneous arrival problem'. In plain English, that's when you want to point lots of missiles or rockets at a target and have them go boom at the same time".

The British taxpayer also funded Chinese research into air-breathing hypersonic vehicles, which the US is hurrying to develop, with the Defense Research Advanced Projects Agency (DARPA) conducting tests this year. After a researcher from the PRC at Manchester joined a counterpart at a Chinese military-linked university to create a new ceramic coating, Manchester itself described the "new kind of ceramic coating that could revolutionise hypersonic travel for air, space and defence purposes" and how "ultra-high temperature ceramics...are needed in aero-engines and hypersonic vehicles such as rockets, re-entry spacecraft and defence projectiles." At the Chinese university, the material was partly made at what Manchester called the "Powder Metallurgy Institute": the similarly named "State Key Laboratory for Powder Metallurgy" is a designated major military laboratory.

In November 2020, images appeared in the press showing a Chinese H-6N aircraft carrying a missile whose features may "be air-breathing and nuclear-capable". The H6-N is manufactured by a subsidiary of the Aviation Industry Corporation of China (AVIC), China's leading military aircraft supplier, which is supplying the PLA Air Force with its next-generation stealth fighter and strategic bomber. AVIC is also a major shareholder in the Aero Engine Corporation of China (AECC), whose subsidiary BIAM has sponsored some of Manchester's hypersonics research. The missile itself was of a similar shape to the DF-17 experimental hypersonic missile, which coincidentally is manufactured by a subsidiary of the other sponsor of hypersonic research at Manchester, CASC.

The government recently promised that it would "stop states using...UK academia to develop chemical, biological, radiological and nuclear weapons and advanced military technology". But unlike the US, the UK is yet to sanction a single Chinese military conglomerate or university. Without these reforms, this dangerous strategic incoherence will continue.

An Indian audience will find many more areas of concern in our research, like collaborations in very large floating structures (VLFS), another technology that would allow maritime power-projection, and drone technologies known to be of interest to the Chinese military conglomerates which sell to countries on India's periphery.

The partnership between the UK and India is growing, and solving these challenges will be a natural area for cooperation. The collaborations we describe developed under the so-called "Golden Age" of UK-China relations to around 2016, and the UK government today is increasingly aware of these problems. We hope that in some cases UK universities will find Indian organisations more salubrious partners. As our research shows, the success of the British government's welcome Indo-Pacific pivot will depend on deeper strategic reform, and relationships with regional allies like India will be central to this approach.

Dr Radomir Tylecote is Director of Defence and Security for Democracy (DSD), Civitas. Robert Clark is Defence Fellow, Henry Jackson Society.

<https://www.sundayguardianlive.com/world/uk-universities-research-chinese-military-growing-concern-india>

Exclusive: Amid WFH, Young scientists at ISRO's VSSC develop ventilators, oxygen concentrators

Dr S Somanath elucidated on the in-house medical technologies that are ready for industry adoption, free of cost

By Sidharth MP

Pan-India Lockdown, local government restrictions and the new normal of Work from home (WFH) have not deterred India's best brains working at the Indian Space Research Organization (ISRO). The first and second wave of the pandemic, have affected the schedule of the core space-related activities at ISRO. However, even while working from home, ISRO's scientists have been immensely contributing to the country's Covid-19 fight by developing crucial medical equipment such as ventilators, oxygen concentrators etc. In an exclusive conversation with Zee Media.

Dr S Somanath, Director, Vikram Sarabhai Space Center (VSSC), Thiruvananthapuram, elucidated on the in-house medical technologies that are ready for industry adoption, free of cost.

Under the series 'Prana', three variants of ventilators that are fitted with displays and controls, have been developed by the ISRO teams from VSSC, based on modifications to existing designs and also based on their own unique, patented designs. The first one is similar to the Ambu-bags (artificial manual breathing unit), but this home-grown variant can deliver a good amount of volume and pressure, thanks to its unique design and proper actuation system.



A high-end ventilator, with pneumatic regulation (operated by air under pressure), has also been developed by this team and this offering is said to cost around Rs.1 lakh, which is just about half or one-third the price of similar industry offerings.

The most unique of them all is a ventilator that does not require power or an electric motor, drive. Using compressed air and certain other technological features, it can facilitate the inhale-exhale cycle.

"All of these medical equipments have been designed and developed to WHO standards, our quality and testing teams worked with doctors for evaluating the devices. The electronics, controls, software, circuits, for ventilators and oxygen concentrators are all developed in-house by our young scientists, but we'll be giving it free to industry for mass manufacture. This technology will be handed over to technically competent industries and many have approached us already, so it is expected to be ready in a week's time" Dr. Somanath told Zee Media.

As India's lead centre for building rockets and related technology, VSSC has the distinction of having engineers from across domains. It was this wide-ranging engineering expertise, coupled with immense knowledge of design, materials, mechanics and software that made these indigenous developments possible within a short span.

In designing and developing the Oxygen Concentrator- 'Shwaas', ISRO took some valuable lessons from the country's upcoming human spaceflight programme Gaganyaan, for which they were developing Carbon Dioxide removal systems. Despite the technology of oxygen

concentrators being well-known and established, vast majority of the oxygen concentrators being used in India are imported ones. Hence, ISRO focussed on engineering one with a unique technology that absorbs nitrogen (the largest constituent gas) from air using molecular absorption. Simply put, the air is pumped through a chemical column, which absorbs the nitrogen and provides oxygen of around 95% purity. This equipment can function non-stop for upto a year, following which the chemical used in the absorption process (which is available in the market) will have to be replaced.

With the capability to provide 10Liters of Oxygen per minute, it can simultaneously provide support for two regular patients or one critical patient. The prototype of this variant is already in operation at the VSSC hospital and it is expected to cost no more than Rs.50,000.

“These medical equipment are not under our area of work, it requires a deep understanding of human physiology, breathing process etc.. Such devices aiding respiration must be able to sense, sync with unique breathing patterns and assist Doctors in saving lives. So, our young engineers, most of whom are in their 20s and 30s studied the theory and explored the processes to make this happen. It was a collaborative effort between several teams largely working from home and partly from labs, under the guidance of seniors and technicians. Ours is a highly inspired work culture, it’s not just about building rockets, we are ready to take on any challenge with our enthusiasm and ideas” Dr.S. Somanath says with pride.

The Indian Government-run Space agency has also been providing liquid oxygen to State Governments in Kerala, Tamil Nadu and Andhra Pradesh, from their manufacturing facilities or from existing stock. It is important to note that Liquid Oxygen, known as (Lox) in the aerospace parlance, is a crucial resource for any modern space agency, as it is used as an oxidizer in cryogenic engines that power large rockets. ISRO Propulsion Complex (IPRC) in Mahendragiri, Tamil Nadu, which is responsible for the production of Cryogenic fuels has been supplying liquid Oxygen to the State Governments in Tamil Nadu and adjoining Kerala.

“IPRC has supplied over 150Tons of Lox to Kerala and Tamil Nadu Governments since 24th April and continues to do so. Our daily production capacity was 2.5tons, but we have progressively scaled up to 11 tons per day by working round-the-clock with more staff. Around 20tons of Lox stored at our spaceport in Sriharikota, Andhra Pradesh has also been provided to the state government” Dr. K.Sivan, Chairman, ISRO told Zee Media.

ISRO has also provided the large capacity fuel tanks at their facilities to be repurposed and used as stores of liquid oxygen in various states. These tanks serve as a hub for mass storage of liquid oxygen, following which they can be distributed to the healthcare facilities in the region.

<https://www.dnaindia.com/india/report-exclusive-amid-wfh-young-scientists-at-isro-s-vssc-develop-ventilators-oxygen-concentrators-2890356>

China lands rover on Mars, third country to perform successful soft landing on the planet

The Zhurong rover, a part of China's Tianwen-1 mission to Mars, will, among other things, hunt for biosignatures for any past life or habitability on the planet

By Sandhya Ramesh, Edited By Poulomi Banerjee)

Bengaluru: China successfully landed the Zhurong rover on Mars Saturday, making it the country's first landing on another planet and the third country to perform a successful soft landing successfully on Mars, after the former Soviet Union and the USA.

The rover is a part of the Tianwen-1 mission, which entered the orbit around Mars in February.

The lander, with the rover attached, touched down in Utopia Planitia, in the northern hemisphere of Mars – a large, vast plain that was once thought to have been an ancient ocean. The lander has currently deployed its solar panels, and is expected to release the rover within a week.

The Zhurong rover, just like NASA's currently active rovers on Mars, is also primarily astrobiological in nature – which means that it will search for present, or most importantly, past life on the planet. It will range on the surface, powered by solar panels, and probe the surface and subsurface of the planet, performing in-situ chemical analyses on soil composition, while also hunting for biosignatures for any past life or habitability.

It is also considered to be a precursor to the sample return mission that China plans for the 2030s and is expected to function for at least three months.

The first spacecraft to land on Mars successfully was Mars 3, launched by the Soviet Union in 1971. It, however, stopped transmitting after just 110 seconds. Russia has not had a successful landing since. The European Union (EU) has also attempted to land on Mars, but not been successful yet.

There are currently fourteen spacecraft working on or around Mars. These include eight orbiters, two landers, three rovers – including Zhurong, and one helicopter.

Zhurong's objectives and design

The rover is equipped with six scientific payloads including a ground penetrating radar, multi spectral and topography cameras, magnetic field detectors, and weather instruments. Together with the orbiter, there are a total of 13 payloads that will help study the geology and surface composition of Mars, underground layers of soil, the internal structure of the planet, the weather and climate, the ionosphere, and the planet's barely remnant magnetic field.

The mission is both astrobiological, in nature, and is a technology demonstrator as well. Zhurong will also cache and store rock and soil samples for China's upcoming planned sample return missions in the 2030s.

The rover performed its landing with a similar “seven minutes of terror”, as had the NASA landers, when the autonomous landing worked itself out in its most crucial stage nearly 350 million km away, with an 18-minute delay in signal reception and no human intervention. The landing took place with the expected assistance of a heat shield and a parachute.



Representational Image | Youtube | CCTV America

The landing platform that houses the rover, fired its retro thrusters just before the final descent, and the final spot of touchdown was chosen autonomously based on real time data from terrain navigation and altitude cameras.

The rover will move around on six sturdy wheels and is expected to function for a minimum of three months.

The landing site

Utopia Planitia is the site of an ancient ocean on Mars, back when the planet was covered with liquid water, billions of years ago, much like the Earth is today. The site consists of layers and layers of sedimentary soil that could reveal crucial information about the presence of water — and any possibility of past life.

Water is considered to be a key component in our hunt for any forms of life outside the Earth, owing to its ability to dissolve and transport a wide variety of nutrients and minerals, its ability to remain liquid over a wide range of pressures and temperatures, and more.

The ground penetrating radar on board the rover will look for pockets of salt water and water ice below the surface in this region, studying the location in two different frequencies for depths of up to 33 feet. Such pockets of water and ice under the surface are important finds, as they would be protected against the dangerous radiation that bathes the planet's surface, and could potentially be a habitat for microscopic lifeforms.

<https://theprint.in/science/china-lands-rover-on-mars-third-country-to-perform-successful-soft-landing-on-the-planet/658736/>



Sat, 15 May 2021

Nanophotonics enhanced coverslip for phase imaging in biology

The ability to visualize transparent objects such as biological cells is of fundamental importance in biology and medical diagnostics. Conventional approaches to achieve this include phase-contrast microscopy and techniques that rely on chemical staining of biological cells. These techniques, however, rely on expensive and bulky optical components or require changing, and in some cases damaging, the cell by introducing chemical contrast agents. Significant recent advances in nanofabrication technology permit structuring materials on the nanoscale with unprecedented precision. This has given rise to the revolutionary field of meta-optics that aims to develop ultra-compact optical components that replace their bulk-optical counterparts as for example lenses and optical filters. Such meta-optical devices exhibit unusual properties for which they have recently drawn significant scientific interest as novel platforms for imaging applications.

In a new paper published in *Light Science & Applications*, a team of scientists, led by Professor Ann Roberts from the University of Melbourne node of the Australian Research Council Center of Excellence for Transformative Meta-Optical Systems have developed an ultra-compact, nanostructured microscope coverslip that allows the visualization of unstained biological cells. The device is referred to as a nanophotonics enhanced coverslip (NEC) since it adds phase-imaging capability to a normal microscope coverslip. In their study the researchers demonstrated that by simply placing biological cells on top of the NEC, high-contrast pseudo 3D images of otherwise invisible cells are obtained. The scientists used the example of human cancer cells (HeLa cells) to demonstrate the potential of this new phase-imaging method. The method not only enabled visualization of the general shape of the cancer cells but also made details of the cell nucleus visible. This capacity is crucial since the detection of changes in the structure of biological cells underpins the detection of diseases as for example in the case of malaria.

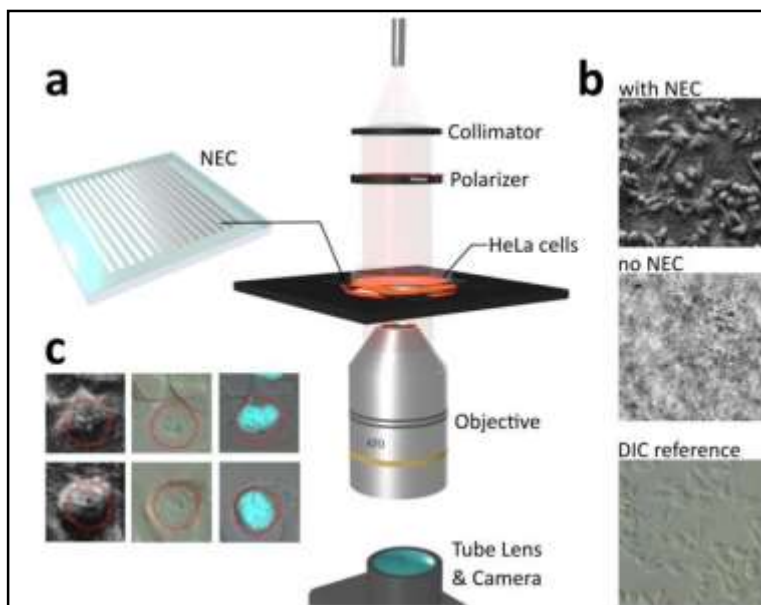
The version of the NEC presented in the publication differs from a normal coverslip through the addition of a thin-optical film and a nanometer spaced grating. The research team, however, envisage more complex variations of this concept to further extend the capabilities of the method to operation at different wavelengths and integration into highly-specialized optical imaging or microfluidic systems. In conclusion, this research has demonstrated an entirely new phase-imaging method that carries significant potential to be part of future biological imaging systems and mobile medical diagnostic tools.

The scientists summarize the potential of their phase-imaging method: "We designed a nanostructured microscope coverslip that allows us to visualize otherwise transparent biological cells simply by placing them on top of the device and shining light through them. This is an exciting breakthrough in the field of phase-imaging, since our method requires neither the use of bulk-optical components, chemical staining or computational post processing as it is the case with conventional methods." Prof. Roberts explained.

"The unavailability of medical diagnostic tools in many developing nations is regarded a reason for infectious diseases like malaria and tuberculosis to still be a leading cause of death. Our approach has significant potential to become an inexpensive, ultra-compact phase-imaging tool that could be integrated into smartphone cameras and other mobile devices to make mobile medical diagnostics broadly available." Dr. Wesemann added.

More information: Lukas Wesemann et al, Nanophotonics enhanced coverslip for phase imaging in biology, *Light: Science & Applications* (2021). DOI: [10.1038/s41377-021-00540-7](https://doi.org/10.1038/s41377-021-00540-7)

Journal information: *Light: Science & Applications*
<https://phys.org/news/2021-05-nanophotonics-coverslip-phase-imaging-biology.html>



a The nanophotonics enhanced coverslip (NEC) adds phase imaging capability to a normal microscope coverslip, thereby shrinking bulky phase-imaging methods down to the size of a chip. The less than 200 nm thick design consists of a subwavelength spaced grating on top of an optically thin film, supported by a glass substrate. **b** Exemplary demonstration of phase-imaging of human cancer cells (HeLa cells) using the NEC. By placing the Petri dish containing the cell culture directly on top of the NEC, pseudo 3D images of the cells are created. The obtained images are similar to those obtained by the conventional phase-imaging technique of differential interference contrast (DIC) microscopy. In the reference image, recorded without the NEC, the cells are mostly invisible. **c** Use of the NEC device not only enabled visualization of the general shape of the cell, but also features inside of the cell nucleus (left). This was confirmed via comparison with images obtained via conventional DIC microscopy (middle) and fluorescence microscopy (right). Credit: Lukas Wesemann, Jon Rickett, Jingchao Song, Jieqiong Lou, Elizabeth Hinde, Timothy J. Davis, and Ann Roberts

Is the past (and future) there when nobody looks?

In 1961, the Nobel prize winning theoretical physicist Eugene Wigner proposed what is now known as the 'Wigner's friend' thought experiment as an extension of the notorious Schrodinger's cat experiment. In the latter, a cat is trapped in a box with poison that will be released if a radioactive atom decays. Governed by quantum mechanical laws, the radioactive atom is in a superposition between decaying and not decaying, which also means that the cat is in a superposition between life and death. What does the cat experience when it is in the superposition? Wigner sharpened the question by pushing quantum theory to its conceptual limits. He investigated what happens when an observer also has quantum properties.



An observer (Wigner's friend) performs a quantum measurement on a spin system. Later, Wigner measures the friend and spin in an entangled basis. As a consequence of this measurement, not only does the friend not reliably remember his past observed outcome, but cannot even quantify this ignorance with a reasonably

In the thought experiment an observer, usually called Wigner's friend, performs a quantum measurement and perceives an outcome. From the point of view of another observer, called Wigner, the measurement process of the friend can be described as a quantum superposition. The fact that quantum theory sets no validity limits for its application leads to a clear tension between the perception of the friend, who sees a specific single result, and the description of Wigner, who observes the friend in a superposition of different perceptions. This thought experiment thus raises the question: What does it mean for an observer in a quantum superposition to observe the result of a measurement? Can an observer always trust what they see and use this data to make predictions about future measurements?

In their recent paper published in *Communications Physics*, a team of researchers, led by Caslav Brukner, from the University of Vienna, the Institute of Quantum Optics and Quantum Information (IQOQI-Vienna) of the Austrian Academy of Sciences and the Perimeter Institute for Theoretical Physics investigate the limits that Wigner's friend's thought experiment imposes on an observer's ability to predict their own future observations. To this end, the authors identify a number of assumptions, all traditionally considered to be at the core of quantum formalism. These allow an observer in standard experimental situations to predict the probabilities for future outcomes, on the basis of their past experiences.

The assumptions constrain the probabilities to obey quantum mechanical laws. However, the researchers prove that these assumptions for Wigner's friend cannot all be satisfied in the thought experiment. This work raises important questions about the "persistent reality" of the friend's perceptions. Indeed, the authors show that in a Wigner's friend scenario, it is impossible to consider the friend's perceptions to be coexistent at different points in time. This makes it questionable whether a quantum observer in general can consider their own past or future experiences to be as real as their present ones. Philippe Allard Guérin, the lead author of the study, says "Our work shows that at least one of three key assumptions of quantum mechanics must be violated; which one depends on your preferred interpretation of quantum mechanics."

More information: Philippe Allard Guérin et al, A no-go theorem for the persistent reality of Wigner's friend's perception, *Communications Physics* (2021). DOI: [10.1038/s42005-021-00589-1](https://doi.org/10.1038/s42005-021-00589-1)

Journal information: [Communications Physics](https://phys.org/news/2021-05-future.html)
<https://phys.org/news/2021-05-future.html>

Using micro-sized cut metal wires, team forges path to new uses for terahertz waves

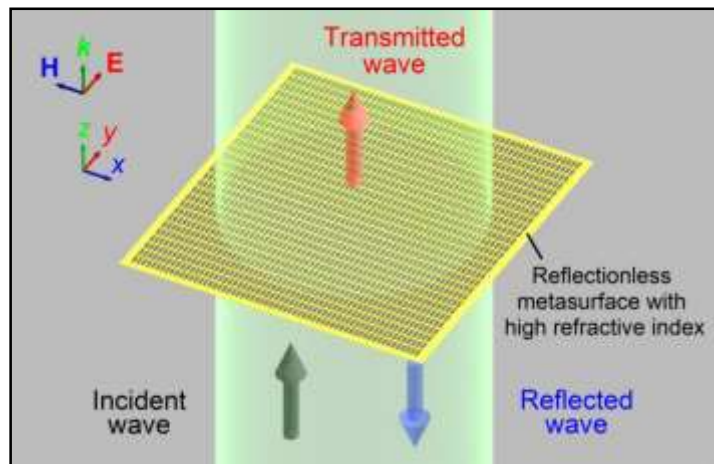
Japanese researchers successfully tested reflectionless, highly refractive index metasurface that may eventually be used in practical applications to send, receive, and manipulate light and radio waves in the terahertz waveband (THz). THz is measured in millionths of a meter, known as micrometers. The metasurface, an artificial two-dimensional flat material, was made of micro-sized cut metal wires of silver paste ink placed on both the front and back of a polyimide film. The team, led by Takehito Suzuki, Associate Professor at the Tokyo University of Agriculture and Technology (TUAT) Institute of Engineering, published their findings on April 29, 2021 in *Optics Express*.

Such flat metasurfaces represent a leap forward in the study of THz optics, because they may be flexible, adaptable to a much wider array of potential uses, and far smaller than the present generation of THz optics which rely upon naturally occurring materials that have fixed indices of refraction in the THz waveband, such as cyclo-olefin polymer, magnesium oxide, and silicon. An index of refraction of a material shows that how slow electromagnetic waves travel in the material compared to a vacuum.

A greater ability to receive, transmit, control, and manipulate electromagnetic waves above 1.0 THz is necessary to unlock their potential, which remains largely untapped, according to Suzuki. "The reflectionless metasurface with a high refractive index above 1.0 THz can offer an accessible platform for terahertz flat optics such as 6G wireless communications and other possible commercial applications," Suzuki said. "In addition to vastly faster wireless data transfer speeds, a better ability to manipulate THz waves using metasurfaces may greatly advance technology in the areas of wavefront shaping, beam forming, polarization control, and optical vortices—subjects of great interest to the scientific and communication communities."

Suzuki's research team set out to support the greater scientific community's goal of replacing conventional three-dimensional bulky optical components with two-dimensional flat ones, a feat that would free up space and allow the development of smaller, more adaptable scientific and communication instruments, as well as more advanced security cameras.

The team, Harumi Asada, Kota Endo, and Takehito Suzuki, created their experimental metasurface using silver paste ink and a very thin polyimide film. Cut metal wires with a silver paste ink laid onto the film by a super-fine ink-jet printer (SIJ Technology, Inc.) capable of drawing lines in the order of 10 micrometers in width, yielded the result they had hoped for: The metasurface, which was made of 80,036 pairs of cut metal wires with silver paste ink on both the front and back of 6x6 square millimeters (roughly an infant's thumbnail) plot of a polyimide film, has a high refractive index and low reflection at 3.0 THz.



Researchers from Tokyo University of Agriculture and Technology successfully tested reflectionless, highly refractive index metasurfaces that may eventually be used in practical applications to send, receive, and manipulate light and radio waves in the terahertz waveband (THz). Credit: Takehito Suzuki, Tokyo University of Agriculture and Technology

Suzuki and his collaborating scientists plan to further investigate the potential of flat optics for use in the THz waveband, with the hope of finding scalable, commercially viable materials suitable for a wide array of future uses.

More information: Asada Harumi et al, Reflectionless metasurface with high refractive index in the terahertz waveband, *Optics Express* (2021). [DOI: 10.1364/OE.420827](https://doi.org/10.1364/OE.420827)

Journal information: *Optics Express*

<https://phys.org/news/2021-05-micro-sized-metal-wires-team-forges.html>

COVID-19 Research News



Sun, 16 May 2021

Italian study shows COVID-19 infections, deaths plummeting after jabs

COVID-19 infections in adults of all ages fell by 80% five weeks after a first dose of Pfizer (PFE.N), Moderna (MRNA.O) or AstraZeneca (AZN.L) vaccine, according to Italian research published on Saturday.

The first such study by a European Union country on the real-world impact of its immunisation campaign was carried out by Italy's National Institute of Health (ISS) and the Ministry of Health on 13.7 million people vaccinated nationwide.

Scientists started studying data from the day Italy's vaccination campaign began, on Dec. 27 2020, until May 3 2021.

The analysis showed that the risk of SARS-CoV-2 infection, hospitalisation, and death decreased progressively after the first two weeks following the initial vaccination.

"As of 35 days after the first dose, there is an 80% reduction in infections, 90% reduction in hospitalisations, and 95% reduction in deaths," the ISS said, adding that the same pattern was seen in both men and women regardless of age.

"This data confirms the effectiveness of the vaccination campaign and the need to achieve high coverage across the population quickly to end the emergency," ISS president Silvio Brusaferro said in the statement.

Among the nearly 14 million people included in the Italian study, 95% of those who had taken Pfizer and Moderna had completed the vaccine cycle, while none of those given AstraZeneca had received a second dose.

Up until now, Italy has been following the makers' recommendations, giving a second dose of Pfizer three weeks after the first, a second dose of Moderna after a four week gap and a second dose of AstraZeneca after a 12 week gap.

As of Saturday morning, some 8.3 million Italians, or 14% of the population, were completely vaccinated, while around 10 million people had received a first jab.

<https://www.reuters.com/business/healthcare-pharmaceuticals/italian-study-shows-covid-19-infections-deaths-plummeting-after-jabs-2021-05-15/>

