Sept
2020

समाचार पत्रों से चयित अंश
Newspapers Clippings

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

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CONTENT

DRDO News

COVID-19: DRDO's Contribution

Press Information Bureau
Government of India

Ministry of Defence

Thu, 03 Sep 2020 1:11PM

Development of "Healthy Air", a Herbal-based Immunity Boosting Room Freshener

Defence Institute of Advanced Technology, a Deemed to be University, Pune has now developed herbal-based immunity boosting room freshener product named "Healthy Air" to contain the spread of COVID-19.

The product Healthy Air has been developed by Deptt of Metallurgical and Materials Engineering with various extracts of herbal oils like Neem, Neelgiri, Camphor, Daalcheeni, Tulsi, Lemon, Turmeric, Laung, Ajwain, Lavender, Elaichi, Turmeric, Natural Vetiveru, Raimuniya and Pine Oil. The product consists of a blended solution of the natural herbal oils, which instinctively acts as an immunity booster for the body, and exhibits Anti-cancerous, Anti-microbial, Anti-viral and Anti-fungal properties. It is herbal-based product is non-carcinogenic, non-toxic, non-mutagenic, and purifies the air, and makes it breathable.

The product is also experimented in Aerodynamic state of the art Laser Based Visualisation Lab for understanding the flow profile, formation of primary aerosol particles, aerosol breakdown thresholds as a function of particle size, particle density etc. It resulted that formation of secondary particles are not noticed which result in poor dispersion of primary particles.

The product has resulted to removing the toxic fumes, cleanses the air, and does not contain any synthetic solvent/surfactant in its formulation. Further, it possesses the stress and anxiety reducing capabilities upon breathing and helps in treating the respiratory illness. Considering the blend of herbal extracts, the developed product acts as a natural insecticide, with no toxicity for human body, and in addition acts as a room freshener.

Healthy Air does not contain any synthetic chemicals nor secondary solvents. Whereas the commercial room fresheners mostly contains synthetic adsorbents, surfactants, disinfectants, oxidizers, allergens, and chemical air sanitizers in the main formulation could affect respiratory system & brain neural sensing, do not contain any immunity boosting agents and does not possess the anti-bacterial properties.

Healthy Air supports respiratory condition in healthy way, does not affect brain neural sensing and useful for people suffering from allergic reactions, breathing problems related to asthma, headache, nasal irritation, or soreness in throat as the product is mainly made of natural herbal extracts which works as immunity booster.

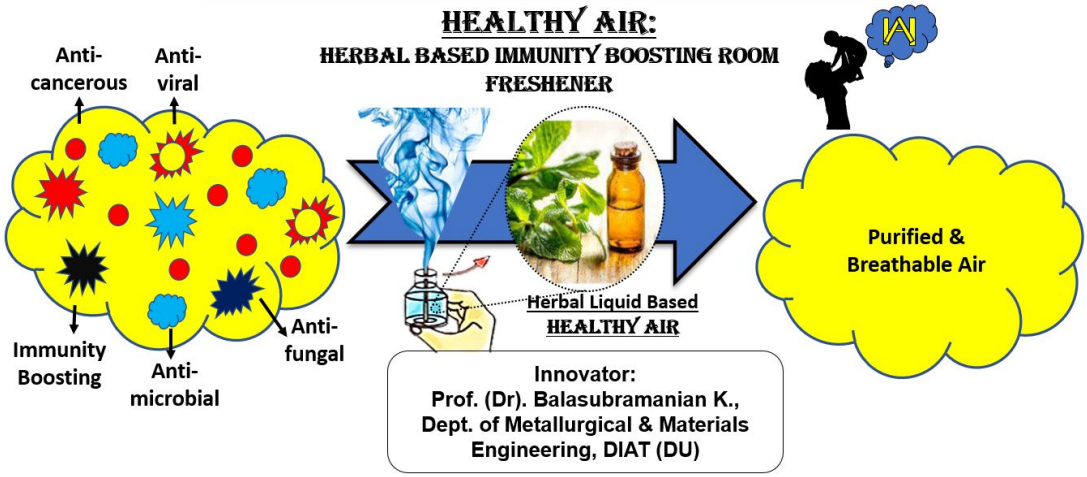
The product can be used in any kind of rooms, conference halls, at public places, hospitals, malls, cinema halls, waiting lounges / rooms of Airports / Railway Stn etc. This product is packed in a container with wick also will be loaded in a dispenser.

The technology transfer of this product freely available for Indian technology start-ups, and companies in its fight against the current pandemic situation.

Defence Institute of Advanced Technology
(Deemed to be University)
Girinagar, Pune- 411025

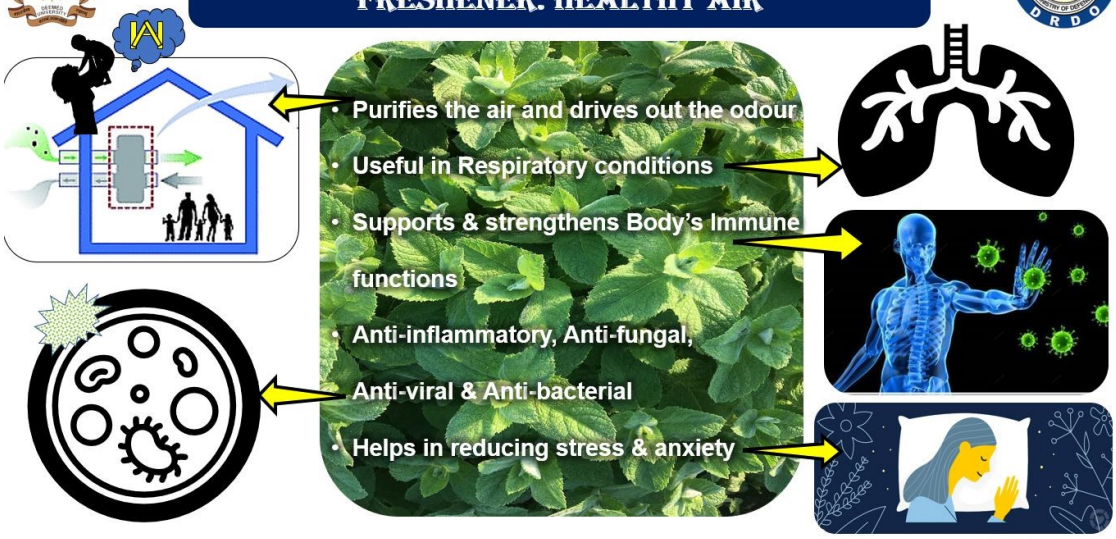
HEALTHY AIR:

HERBAL BASED IMMUNITY BOOSTING ROOM FRESHENER



Innovator:
Prof. (Dr). Balasubramanian K.,
Dept. of Metallurgical & Materials Engineering, DIAT (DU)

HERBAL BASED IMMUNITY BOOSTING ROOM FRESHENER: HEALTHY AIR



HEALTHY AIR: PROPERTIES & CONSTITUENTS

Properties :

1. **Viscosity:**
   1 centipoise at 34 °C
2. Non-Toxic
3. Non carcinogenic
4. Non mutagenic
5. Immunity Boosters
6. Cleanses from toxic fumes
7. **Solvent Free**

Constituents (V/V%) :

- Azadirachta indica
- Chrysopogon zizanioides
- Cinnamomum verum
- Cinnamomum camphora
- Citrus lemon
- Curcuma longa
- Eucalyptus globulus
- Lantana aculeata
- Lavandula
- Malus pumila Mill
- Ocimum tenuiflorum
- Pinus sylvestris
- Trachyspermum ammi
- Syzygium aromaticum
- Elettaria cardamomum

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PROPOSED MODE OF TREATMENT: SPRAY

Spraying Techniques for Liquid Release:

- Liquid-based Heat Vaporization Spray
- Pressure Gun Spray
- Plasma-based Spray
- Two-Wire Electric Arc Spraying

FLOW PROFILE & VISUALIZATION OF THE SOLUTION UNDER LASER LIGHT

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1650935

Outlook

Fri, 04 Sept 2020

A lot of technologies developed to deal with cold weather in northern mountains: DRDO Chief

New Delhi: A lot of technologies have been developed to deal with the extreme cold weather in the country"s northern mountains and the armed forces are using all of them, DRDO chairman G Satheesh Reddy said on Thursday. These range from technologies developed for clothing for the armed forces to predicting avalanches, he said during a webinar organised by the India Foundation.

To a question on whether the armed forces are prepared to deal with the harsh winter as more troops are being moved to Ladakh amid the border tensions there, Reddy said, "In the northern mountain region...about the snow and all that... lot of technologies have been developed towards that, whether the clothing that is required, the shoes which are required, or the heating elements which are required, things related to heating of food".

"Many things have been developed, including avalanche and snow prediction. Many things which are required for that have been developed in the country and they are all being used by the armed forces today," the Defence Research and Development Organisation (DRDO) chairman said. The Ladakh region witnesses extreme cold weather and during the winters, temperatures fall far below the freezing point.

Tensions have escalated in the Pangong lake area after China unsuccessfully attempted to occupy certain Indian areas in the southern bank of the lake. India has rushed in additional troops and weapons to the sensitive region.

On Monday, the Indian army said the Chinese military carried out "provocative military movements" to "unilaterally" change the status quo on the southern bank of Pangong lake on the intervening night of August 29 and 30 but the attempt was thwarted by the Indian troops.

In the Galwan Valley clash between the armies of India and China in June, 20 Indian army personnel including a colonel were killed. China has not yet released any casualty figures.

Since the clashes, tensions are on the rise on the northern border along China.

Reddy said to attract young minds, the DRDO is also working with technical education departments and students have been given electives in the B.Tech courses.

He said a lot of colleges in the country will also have defence related courses. "Similarly, we have brought in certified courses through our academic institute in Pune DIAT (Defence Institute of Advance Technology) where a lot of people are getting trained in Artificial Intelligence and cyber technologies.

Every year, 1,000 people in each area will be trained, he said. "We are also trying to take youngsters in DRDO in a big way," Reddy added. If the country wants to transform itself from an arms importer to exporter, the industry has to come forward, he stressed.

"The industry cannot sustain for long by just supplying it to our own armed forces. They have to export. If you have to sustain for 10-15 years, then you need to supply the world. Your systems have to be state of the art. You should have a sustained quality of the product. The cost of the system has to be low," he added.

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

https://www.outlookindia.com/newsscroll/a-lot-of-technologies-developed-to-deal-with-cold-weather-in-northern-mountains-drdo-chief/1929043

नवभारत टाइम्स

Fri, 04 Sept 2020

उत्तरी पहाड़ों में ठंड के मौसम से निपटने के लिए कई प्रौद्योगिकियां विकसित की गयीं: डीआरडीओ

नयी दिल्ली: रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के अध्यक्ष जी सतीश रेड्डी ने बृहस्पतिवार को कहा कि देश के उत्तरी पहाड़ों में अत्यधिक सर्दी के मौसम से निपटने के लिए कई तकनीकों का विकास किया गया है और सशस्त्र बल उन सबका का उपयोग कर रहे हैं।

उन्होंने 'इंडिया फाउंडेशन' द्वारा आयोजित एक वेबिनार में कहा कि इन तकनीकों में सशस्त्र बलों के लिए कपड़ों से लेकर हिमस्खलन का पूर्वानमान तक शामिल हैं। यह पूछे जाने पर कि क्या भयंकर सर्दियों से निपटने के लिए सशस्त्र बल तैयार हैं क्योंकि सीमा पर तनाव के बीच लद्दाख में बड़ी संख्या में सैनिक तैनात किए जा रहे हैं, रेड्डी ने कहा, "उत्तरी पर्वतीय क्षेत्र में ... बर्फ के बारे में और वह सब ... कई प्रौद्योगिकी उस दिशा में विकसित की गई हैं, चाहे जरूरी कपड़े हों या जूते की आवश्यकता हो या गर्म रखने वाले उपकरण हों...।''

रेड्डी ने कहा, "हिमस्खलन और हिमपात की भविष्यवाणी सहित कई चीजें विकसित की गयी हैं। उसके लिए जरूरी कई चीजों को देश में विकसित किया गया है और उन सबका इस्तेमाल आज सशस्त्र बलों द्वारा किया जा रहा है।" लद्दाख क्षेत्र में भयंकर सर्दी पड़ती है और ठंड के मौसम में तापमान शून्य से काफी नीचे चला जाता है।

https://navbharattimes.indiatimes.com/india/several-technologies-were-developed-to-deal-with-the-cold-weather-in-the-northern-mountains-/articleshow/77919126.cms

Defence News

Defence Strategic: National/International

Business Standard

Fri, 04 Sept 2020

Army capable of dealing with Chinese actions in suitable ways: Gen Rawat

India's armed forces are capable of handling aggressive Chinese actions in "best suitable ways", Chief of Defence Staff Gen Bipin Rawat said

New Delhi: India's armed forces are capable of handling aggressive Chinese actions in "best suitable ways", Chief of Defence Staff Gen Bipin Rawat said on Thursday, remarks that came against the backdrop of China's attempts to change the status quo in certain areas in eastern Ladakh.

In an interactive session at the US-India Strategic Partnership Forum, Gen Rawat said India's policy of engagement, if not backed by credible military power and regional influence, would imply acknowledging China's preeminence in the region.

India's first Chief of Defence Staff (CDS) Gen Bipin Rawat

The former Chief of Army Staff said India faces the most complex threats and challenges spanning a full spectrum of possible conflict -- from nuclear to sub-conventional -- but asserted that the armed forces are ready to deal with them.

"Of late, India has been seeing some aggressive actions by China but we are capable of handling these in the best suitable ways," Gen Rawat said at the online event.

In a warning to Pakistan, he said the country will suffer "heavy losses" if it attempts any misadventure against India taking advantage of the border row with China.

The Chief of Defence Staff spoke extensively about how Pakistan has been engaged in a proxy war against India and pushing terrorists into Jammu and Kashmir, attempted to spread terrorism in other parts of the country.

He also touched upon a host of other issues including India's vision for the Indo-Pacific region, importance of defence and security ties with the US and the government's focus on self-reliance in defence manufacturing.

https://www.business-standard.com/article/defence/army-capable-of-dealing-with-chinese-actions-in-suitable-ways-gen-rawat-120090301545_1.html

THE WEEK

Fri, 04 Sept 2020

Tension with China: Army Chief visits Ladakh, IAF Chief inspects airbases

Army Chief's visit coincides with 4th day of brigadier-level talks

By Pradip R Sagar

In the backdrop of ongoing tension on the border with Ladakh, Army Chief General M.M. Naravane landed in Ladakh on Thursday to take stock of the security situation in eastern Ladakh and also to review the operational preparedness. Incidentally, the Army Chief's visit came a day after Indian Air Force Chief Air Chief Marshal R.K.S. Bhadauria made a surprise visit to forward airbases of the Eastern Air Command.

(File) Indian Army Chief General M.M. Naravane | PTI

Since last Saturday, Indian and Chinese troops are locked in an eyeball-to eyeball situation in multiple locations in the southern bank of Pangong Tso in Chushul. On the intervening night of August 29-30, Indian intelligence agencies picked up the movement of over 200 PLA troops, who were trying to transgress on to the south bank of Pangong Tso. Indian forces thwarted the PLA move to change the status quo in the area by deploying specialised troops from the Special Frontier Force. SFF is a covert unit, which comes under the Cabinet Secretariat but with operational control with Indian Army and it has large number of personnel from Tibet, who have settled in India.

The Army Chief's visit coincides with the fourth day of brigadier-level talks between Indian and Chinese armies to bring down the tempers of troops deployed in Chushul. After three consecutive days of military talks, which were "inconclusive", the Indian delegation reached at 11am at the Chushul-Moldo Border Personnel Meeting point to put forward the Indian point of view to resolve the issue amicably.

On Thursday, the Army chief landed in Leh on a two-day visit and will be briefed by senior field commanders on the ground situation. He is also expected to visit some forward locations during his visit.

After Saturday's incident, India and China have amassed their troops in Chushul sector. And it is learnt that Indian troops have taken control over dominant heights in the sector, close to south bank of Pangong Tso, which were placed in the "grey zone" on the Line of Actual Control. Grey zone is the disputed area, on which both sides make their claims.

Rattled by the Indian Army's counter-incursion measure, the Chinese PLA has brought in artillery and armoured elements close to the border, which is a violation of the 1993 agreement between the two sides, explained a senior defence official. He also said that heights close to Reqin La and Rezang La were neither occupied by the Indian Army or by Chinese PLA. "But these locations are strategically important for India, as it gives view of complete Spanggur Gap, Moldo Garrison of China and also on Spanggur lake," the officer said, adding that the Indian forces have taken control of these heights, which has irked the Chinese.

On the northern bank of Pangong Tso, the Indian Army has carried out some readjustments of Indian positions on the Indian side of LAC, as part of precautionary deployment. Chinese PLA has already made significant deployment on the ridge lines of Finger 4 of Pangong Tso by building permanent structures and even a helipad in the vicinity.

IAF Chief Air Chief Marshal R.K.S. Bhadauria also made a visit at the bases in EAC, where he was apprised of the readiness state and operational preparedness of the combat units by the respective air officers commanding.

It is notable that the Indian Air Force has also deployed its assets, including frontline fighters and attack helicopters, in the eastern Ladakh sector to tackle any hostile situation. From its frontline fighters like Su-30MKI to MiG-29, the Indian Air Force has also deployed newly inducted Apache attack helicopters and Chinook strategic heavy-lift choppers.

Responding to India's pre-emptive capture of the strategic area, the Chinese Embassy in India claimed that Indian troops "illegally trespassed" the LAC, which "damaged" peace and tranquillity along the border.

Issuing a statement, spokesperson of Chinese Embassy in India, Ji Rong said, "On August 31, Indian troops violated the consensus reached in previous multi-level engagements and negotiations between China and India, illegally trespassed the Line of Actual Control again at the southern bank of the Pangong Tso and near the Reqin Pass in the western sector of China-India border, and conducted flagrant provocations, which again stirred tension in the border areas."

https://www.theweek.in/news/india/2020/09/03/tension-with-china-army-chief-visits-ladakh-iaf-chief-inspects-airbases.html

नवभारत टाइम्स

Fri, 04 Sept 2020

IAF चीफ ने किया फारवर्ड एयरबेसेज का दौरा तो लेह पहुंचे जनरल नरवणे, नजरें चीन से लगी सीमा पर

चीन से लगी सीमा पर (Border with China) तीना सेना प्रमुखों की पैनी नजर है। सेना प्रमुख जनरल एम एम नरवणे (Manoj Mukund Naravane) दो दिन के दौरे पर लेह गए हैं। वहीं, बुधवार को वायुसेना प्रमुख एयर चीफ मार्शल आरकेएस भदौरिया (Rakesh Kumar Singh Bhadauria) ने पूर्वी कमान के सीमावर्ती हवाई ठिकानों का जायजा लिया।

By Deepak Verma

हाइलाइट्स:

- ***पैंगोंग झील के दक्षिणी किनारे पर भारत-चीन के सैनिकों में झड़प के बाद बढ़ी सक्रियता***
- ***एयरफोर्स चीफ एयर चीफ मार्शल आरकेएस भदौरिया ने फारवर्ड एयरबेसेज का दौरा किया***
- ***जनरल मनोज मुकुंद नरवणे भी अचानक लेह पहुंचे, दो दिन यही रहेंगे***
- ***लाइन ऑफ एक्चुअल कंट्रोल पर हलचल बढ़ने के साथ ही दौरे तेज***

नई दिल्ली: भारत और चीन के बीच 29-30 अगस्त की रात हुई झड़प के वायुसेना प्रमुख ने पहली बार सीमावर्ती हवाई ठिकानों का दौरा किया। एयर चीफ मार्शल आरकेएस भदौरिया बुधवार को पूर्वी वायु कमान की तैयारी का जायजा लेने गए थे। एयरबेसेज पर मौजूद वरिष्ठ अधिकारियों ने वायु सेना प्रमुख को लड़ाकू इकाइयों के ताजा हालात और उनकी तैयारियों के बारे में बताया। इस दौरान उन्होंने कई एयर वॉरियर्स के साथ बातचीत की। अगले दिन, थल सेना प्रमुख जनरल मनोज मुकुंद नरवणे लेह पहुंच गए। यानी घटना के चार दिन के भीतर दो शीर्ष अधिकारी लद्दाख हो आए हैं। उन्हें हालात का बखूबी अंदाजा है और उन्हीं के इनपुट्स पर सरकार आगे की रणनीति तय करेगी।

वेपन सिस्टम की मेंटनेंस देखकर खुश हुए भदौरिया

स्टेशन पर सारे वेपन सिस्टम का बेहतरीन मेंटेनेंस देखकर IAF चीफ तारीफ किए बिना रह नहीं सके। उन्होंने किसी भी स्थिति से निपटने के लिए उनकी तैयारियों की सराहना की। IAF के बयान के अनुसार, वायु सेना प्रमुख ने एयर वॉरियर्स से आग्रह किया कि वे पूरी लगन के साथ अपने कर्तव्य्य का पालन करते रहें।

बॉर्डर पर स्पेशल फोर्सेज भी तैनात

एयर चीफ मार्शल आरकेएस भदौरिया (फाइल)

पैंगोंग झील के दक्षिणी तट पर चीन की नापाक हरकत को भारत के मुस्तैद जवानों ने असफल कर दिया। उस इलाके के सभी 'स्ट्रैटीजिक पॉइंट्स' पर अपनी पैठ मजबूत कर ली है। अब अगर चीन ने जरा भी आगे बढ़ने की कोशिश की तो उसे बेहद मुश्किल चुनौती से निपटना होगा। भारत ने स्पेशल फोर्सेज को भी मैदान में उतार दिया है। 29-30 अगस्त वाली घटना में स्पेशल फ्रंटियर फोर्स के होने की बात सामने आ रही है। सेना ने पूर्वी लद्दाख में वास्तविक नियंत्रण रेखा (LAC) से लगे सभी क्षेत्रों में समग्र निगरानी तंत्र को और मजबूत किया है।

LAC पर IAF की ऐक्टिविटीज तेज

चीनी सैनिक पैंगोंग सो के दक्षिणी तट की ओर बढ़ रहे थे। उनका मकसद उस जगह पर अतिक्रमण करना था लेकिन भारतीय सेना ने प्रयास को नाकाम करने के लिए एक महत्वपूर्ण तैनाती कर दी। भारतीय वायुसेना से भी कहा गया है कि पूर्वी लद्दाख में वास्तविक नियंत्रण रेखा से लगे क्षेत्रों में चीन की वायु गतिविधियां बढ़ने के मद्देनजर अपनी निगरानी बढ़ाए।

सारे लड़ाकू विमान हैं तैयार

पिछले तीन महीनों में, भारतीय वायुसेना ने अपने सभी प्रमुख लड़ाकू विमान, जैसे- सुखोई 30 एमकेआई, जगुआर और मिराज 2000 विमान बॉर्डर एरियाज के पास तैनात किए हैं। IAF ने पूर्वी लद्दाख क्षेत्र में रात के समय हवाई गश्त कर चीन को साफ तौर पर यह संदेश दिया कि वह पहाड़ी क्षेत्र में किसी भी स्थिति से निपटने के लिए तैयार है। एयरफोर्स ने अपाचे लड़ाकू हेलीकाप्टरों के साथ-साथ फारवर्ड पोजिशंस तक सैनिकों को पहुंचाने के लिए चिनूक हेवी-लिफ्ट हेलिकॉप्टर्स को भी तैनात किया है।

https://navbharattimes.indiatimes.com/india/indian-air-force-chief-rks-bhadauria-visited-air-bases-in-the-eastern-sector-amid-tensions-with-china/articleshow/77909209.cms

hindustantimes

Fri, 04 Sept 2020

Indian Army changes border posture

The Indian Army has changed its posture from border management to securing the border on the 1,597 km Line of Actual Control (LAC) in Ladakh after aggression by the Chinese People's Liberation Army in the Chushul sector, followed by additional induction of troops and support elements, people familiar with the matter said

By Shishir Gupta

The Indian Army has changed its posture from border management to securing the border on the 1,597 km Line of Actual Control (LAC) in Ladakh after aggression by the Chinese People's Liberation Army in the Chushul sector, followed by additional induction of troops and support elements, people familiar with the matter said.

The PLA Air Force has also stepped up its activity in the occupied Aksai Chin area, with positions being militarily strengthened.

"The Indian Army is now in a secure border mode to pre-empt any Chinese PLA transgressions in vulnerable areas of Ladakh. The repositioning of Indian forces has been done to take the Chinese aggression into account in the area and to ensure that all positions are defended," said a senior official, requesting anonymity.

The Indian Army has also matched the PLA's troop reinforcement in the sector by deploying additional specialised forces such as the Special Frontier Force (SFF) that was raised to counter China after the 1962 war. SFF soldiers had played a lead role in pre-empting the PLA, which tried to grab Indian territory five days ago on the southern bank of Pangong Tso. Indian soldiers have since then occupied key heights on the southern bank.

The Indian Army has deployed a combat group -- a mix of armoured and mechanised elements -- in the Depsang Plains to match a PLA mechanised brigade and another combat group in Chumar to signal to the PLA that it means business and will not allow even an inch of Indian land to be taken.

India dominates the Demchok and Chumar areas, giving soldiers a clear line of sight to the Lhasa-Kashgar (219) highway, a critical artery for PLA logistics supply. The Indian posture in Chushul clearly indicates that any further PLA perfidy will receive a matching response, a military commander said.

While the PLA, under Chinese President and Communist Party general secretary Xi Jinping, is blaming the Indian Army domestically for aggravating the border situation, Beijing is making no effort to sort out the border row diplomatically or militarily by just restoring status quo ante.

"It is a dead-end posturing as this will not yield any results for PLA as neither side can deploy troops all along the 3,488 km LAC round the clock throughout the year," said a second senior official.

Although military and diplomatic talks are on, Indian Army troopers are leaving nothing to chance and are prepared for the worst case scenario, with decisions being taken on the spot, and not by headquarters.

Tensions have escalated in the Ladakh sector after a June 15 military skirmish in the Galwan Valley left 20 Indian troops and unspecified number of PLA soldiers dead.

https://www.hindustantimes.com/india-news/indian-army-changes-border-posture/story-WQmEuVP8fS4MoqKus2kjbN.html

ThePrint

Fri, 04 Sept 2020

Army now holding 30 dominating heights, earlier unoccupied, on southern bank of Pangong Tso

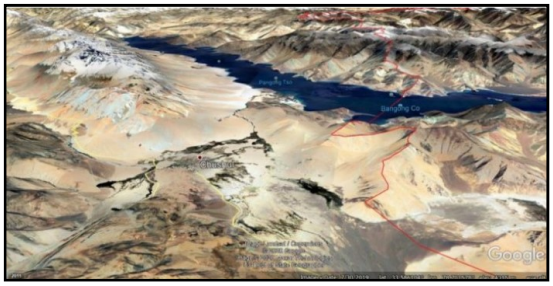
The heights include Rezang La and Reqin La, a series dominating Spanggur Gap covering Patrol Points 27 to 31, among others

By Amrita Nayak Dutta

New Delhi: The Indian Army is holding around 30 dominating heights and other such terrain on the southern bank of the Pangong Tso, all of which were earlier unoccupied or partly held, ThePrint has learnt.

The move comes in the wake of the recent posturing by the Indian and Chinese troops along the Line of Actual Control (LAC) in eastern Ladakh.

According to government sources, the heights include the Rezang La and Reqin La, both dominating the Spanggur Gap and covering Patrol Points 27 to 31. They also include the dominating heights of Black Top, Hanan, Helmet, Gurung Hill, Gorkha Hill and Magar Hill among others.



A Google Earth image showing the elevation on the southern bank of Pangong Tso

Most of these heights and dominating terrain features were unoccupied or lightly held by Indian Army troops before the standoff with China in eastern Ladakh began in early May this year, the sources said.

Since then, some of these areas have been gradually reinforced, while others have been occupied in the last few days as Indian forces pre-empted PLA activity on the southern bank of the Pangong Tso to "thwart Chinese intentions to unilaterally change facts on ground".

The move, the sources said, will work in favour of India in case of a trade-off of territory or while sitting across the table.

Eastern Ladakh has approximately 1,600 sq km of disputed area, of which around 350 sq km is in the south of Pangong Tso. Another 1,250 sq km is disputed in the areas north of the lake, including around 1,000 sq km in the Depsang plains.

Former 14 Corps commander Lt. Gen. P.J.S. Pannu (retd) earlier told ThePrint the southern bank gives the Indian troops an advantage in terms of monitoring the activities in the northern bank. "There has been a hardening of military posturing in the southern bank, too, by the Chinese, given that Indian troops hold certain significant heights in the region."

Situation remains tense

The situation along the LAC continues to remain tense with the Indian and Chinese troops facing each other well within small arms firing range.

Army Chief Gen M.M. Naravane left for a two-day visit to Leh Thursday to review the security situation and operational preparedness in Ladakh region.

As reported by ThePrint earlier, specialised units of the Indian Army have climbed up the heights, facing the ridgelines of Finger 4 in the northern banks of Pangong Tso where the Chinese had built posts in April.

China currently dominates areas between Finger 4 and Finger 8, a distance of about 8 km, which comes within the Indian side of the LAC.

Defence sources said close to three brigades of troops have been deployed in the south of Pangong Tso and additional acclimatised troops are available across eastern Ladakh for any subsequent challenges.

The sources told ThePrint that all troops are fully armed, with rocket launchers and mortars, other than tanks and artillery guns and surveillance equipment, deployed in their support.

Meanwhile, brigadier-level talks have been taking place between the two sides every day since Monday, but have remained inconclusive so far.

The meetings have hinged on the tactical aspects and rules of engagement of troops at the ground level, again to avoid face-offs or escalations.

https://theprint.in/defence/army-now-holding-30-dominating-heights-earlier-unoccupied-on-southern-bank-of-pangong-tso/495077/

Fri, 04 Sept 2020

DNA Exclusive: Indian Army remains on high alert to foil PLA's infiltration bid along LAC ahead of winters

So far, China has been known for its action in the border areas, but the Indian Army's move has surprised the world's largest army, which is likely to retaliate in the coming weeks to reclaim the heights it has recently lost

Edited By Arun Kumar Chaubey

Highlights

1. ***Chief of Army Staff General Manoj Mukund Narwane arrived in Leh on a two-day tour***
2. ***The Army Chief's presence on the front is a clear message for the enemy conveying aggressive intentions of the Indian Army***
3. ***Air Chief Marshal RKS Bhadauria was also on a tour of the Forward Air Bases of the eastern border on Wednesday***

New Delhi: After thwarting the Chinese army's infiltration attempt on the southern side of Pangong Lake in Ladakh, India Army remains on high alert to foil China's nefarious designs to transgress the Line of Actual Control (LAC). So far, China has been known for its action in the border areas, but the Indian Army's move has surprised the world's largest army, which is likely to retaliate in the coming weeks to reclaim the heights it has recently lost.

The next four weeks are understood to be very crucial for the Chinese Army to repel Indian soldiers because the onset of winter season would rather be favourable for the Indian Army, which is considered to be best in the world in mountain warfare.

If China fails to act in the next four weeks, it will have to wait until the next year, and by that time India will establish its base in the region. According to sources, arrangements are being made to keep 20,000 soldiers around Leh during winters. Notably, the temperature of Chushul falls from zero to minus 30 degrees, and on the hills, it falls further.

Currently, there are four times more troops (around 60,0000 are deployed in Ladakh than the last year, but the biggest challenge is to keep them safe in temperatures below zero to minus 40 degrees, and also keep the supply line operational. The first snowfall starts in Ladakh by mid-September, and it continues for the next 7-8 months.

Chief of Army Staff General Manoj Mukund Narwane arrived in Leh on a two-day tour. The Army Chief's presence on the front is a clear message for the enemy conveying aggressive intentions of the Indian Army.

The threat of China is not just in Ladakh, it can also act in the eastern border of the country--Sikkim and Arunachal. Air Chief Marshal RKS Bhadauria was on a tour of the Forward Air Bases

of the eastern border on Wednesday. Assessing the threat, the Indian Army is closely monitoring the border areas with China from Ladakh to Arunachal Pradesh.

The Indian Army has also assessed that the threat is not just from China, but Pakistan may also join China against India, therefore, it is ready to meet any misadventure on the western borders.

India's Chief of Defense Staff General Bipin Rawat said that India wants peace on the border, but reiterated to face any challenge during an interactive session at the US-India Strategic Partnership Forum. Rawat said, "India faces the threat of coordinated action along northern and western fronts which we have to be considered in our defence planning. We have devised our strategy as primary and secondary and conceptualised our strategy for both our borders."

In a warning to Pakistan, CDS Rawat said the country will suffer "heavy losses" if it attempts any misadventure against India taking advantage of the border row with China.

The CDS added, "Pakistan has been launching proxy war...want to expand terrorism in other regions...Pakistan could take advantage if a situation develops in northern border...adequate precautions have been taken and they will suffer heavy losses if they attempt misadventure."

Overall, India has gained a strategic edge over China, which has to think about whether it will go to war or come to the negotiating table. The DNA report will also tell you about the situation under which the Chinese army has been trapped.

Any action on its part during the winter season on the Line of Actual Control will be very difficult. By the next year, the Indian Army will adequate time to strengthen its position, therefore, the current situation at LAC is understood to be favorable for the Indian troops.

A few days ago, a Chinese defense expert praised the Indian Army's ability to fight in the mountains. India's Mountain Force, comprising more than 2 lakh soldiers, is considered the most powerful in the world. China must realize that any misadventure on its part would be disastrous for it, as the India of 2020 is miles ahead of the India of 1962.

Amid the Sono-India standoff along the LAC, the crucial role played by the Special Frontier Force (SFF) has also come to the fore. The valiant soldiers of the SFF are credited to have captured the Black Top and the adjoining hills on the 29th and the 30th August.

Also known as the 'Development Regiment', which was established in the year 1962 after the Sino-India war, the SFF is currently deployed on the LAC. Major General Sujan Singh, who was the leading 22 Mountain Division, established this force, it therefore got the name of 'Establishment 22'.

The headquarters of the 'Vikas Regiment' is currently in Chakrata, Uttarakhand. After India's debacle in 1962, the US intelligence agency CIA trained the soldiers of this force.

Initially, residents from Tibet were only recruited in this force, but Gurkhas are nowadays being recruited as they are adept at fighting in the mountainous regions.

Although the SFF is not part of the Indian Army, it often operates in collaboration with the army, after getting instructions from the PMO. It is known to have participated in the 1971 Indo-Pak war and the Kargil War.

The 'Development Regiment' participates in such military operations which are considered top secrets, and most of the information related to them is classified. There are merely 5000 Commandos in this force, but they are deployed to achieve the impossible-targets.

https://zeenews.india.com/india/dna-exclusive-indian-army-remains-on-high-alert-to-foil-plas-infiltration-bid-along-lac-ahead-of-winters-2307377.html

Business Standard

Fri, 04 Sept 2020

In Ladakh, India has little choice but to make China pay a cost

Avoiding hard choices in Ladakh is only postponing the inevitable reckoning

By Ajai Shukla

China's violations of the Line of Actual Control (LAC) at multiple locations in eastern Ladakh, its blocking of Indian troops from territory that our jawans have patrolled for decades and its almost contemptuous rejection of India's calls for a return to the positions of April, underlines the disdain in which Beijing holds New Delhi. India's political leaders – with their cynical focus on domestic politics – have repeatedly chorused Beijing's assertion that the People's Liberation Army (PLA) has not captured any Indian territory and that the dispute is all about "differing perceptions of the LAC." Chinese officials will be rightly wondering what, in these circumstances, there is to negotiate.

With the Indian military confined to blocking further ingress rather than evicting the PLA from the territory it has captured, there is little pressure on Beijing to restore the status-quo-ante. With China having earlier secured its claim lines of 1956 and 1960 by conquest in 1962, a new claim line of 2020 is coming into being. As this happens, senior Chinese officials are counselling patience. Beijing's ambassador to India, Sun Weidong, last week recited the boilerplate formulation that the boundary question was "left over from history" and should be "handled with patience". On Sunday, State Councillor and Foreign Minister Wang Yi declared in France that China would never be the first to escalate the situation. All this is said with a straight face even though the PLA's violent forays into Indian-claimed territory have effectively abrogated the four agreements Beijing and Delhi created together to keep the border peaceful. And with China refusing to even tell India where its claimed LAC runs, it is messaging that it cares little if the border remains unsettled since it pays no cost.

In the circumstances, there seems to be little choice but to make China pay a cost, even if the cost we pay is higher. New Delhi would remember how Egypt imposed upon a far more powerful Israel a cost for its enmity, even fighting a limited war to bring Tel Aviv to the table. Israel's crushing defeat of the combined Arab armies of Egypt, Syria and Jordan in the Six-Day War of 1956, coming soon after its victory in the 1948 War, had engendered a widespread impression of Israeli invincibility and Arab impotence. Egyptian President Anwar Sadat realized that the development of his country was held hostage by the no-war-no-peace situation that existed with Israel. Knowing that an acceptable and sustainable peace settlement with Israel required Tel Aviv to be equally convinced of its benefits, Sadat ordered his military to prepare for a war with clear strategic aims. Even if it did not end in victory, Sadat realistically aimed at damaging Israel's military, demonstrating that Arab military power could not be disregarded and that the Israeli people's long-term security would be furthered by a stable peace with Egypt. In October 1973, the combined Egyptian-Syrian armies launched a surprise offensive into Israel on Yom Kippur day, a holy day for Jews, capturing parts of the Sinai Peninsula and Golan Heights. In the 20 days that followed, Israel recovered from these setbacks, eventually recapturing the territory. But the realisation that enduring enmity with the Arabs entailed a price brought Israel to the peace table. Sadat paid a historic visit to Israel in 1977, Egypt recognised it as a country and Cairo and Tel Aviv eventually normalised relations with the Camp David Accords in 1978.

It is nobody's case that India lightly takes on China in a war for peace. However, like Sadat's Egypt, New Delhi must clearly demonstrate to Beijing that China will pay a price for its relentless strategic undermining of India, while it would benefit from ensuring that the unresolved boundary does not trigger conflict. In the medium-to-long term, that would require a mutually agreed

delineation of the LAC; a verifiable freezing of the status quo, and finally the give and take needed to agree on the new boundary.

For this, India must do what is necessary – including the use of military power – to enforce a PLA withdrawal to its side of the LAC. If China insists in the negotiations upon retaining its territorial gains, it must also feel the pain. This is feasible, now that India's military has built up its numbers and neutralised the PLA's head start. The army has moved over a division worth of Special Forces to Ladakh, which can operate between Chinese positions and occupy tactically important heights to isolate them. The air force, despite its shortfalls in fighter aircraft and force multipliers such as airborne warning and control aircraft and mid-air refuellers, enjoys significant advantages over the PLA Air Force, whose aircraft would suffer major performance degradation from operating from the oxygen-starved, high-altitude airbases in Tibet. Unlike in 1962, Indian ground troops would benefit from close air support. Meanwhile the Indian Navy is well placed to put pressure on Chinese shipping at a time where the PLA Navy is already preoccupied with confronting the US Navy in the South China Sea. It is not necessary to start a full-scale war; the military must be allowed to create its own escalation ladder, escalating in a calibrated manner, both geographically and in the application of force. If the PLA rushes to escalate and Indian forces are getting overwhelmed by China's over-hyped military – which has not been tested in combat since 1979, and it failed that test – India can threaten use of its painstakingly created nuclear triad. To win, India needs only not to lose, while steadily imposing costs on China.

New Delhi could also signal it is considering abandoning its equidistance from Beijing and the US-led, anti-China coalition. It is unclear why Prime Minister Narendra Modi, whose Bharatiya Janata Party has left no stone unturned in criticising the policies and achievements of his predecessor, Jawaharlal Nehru, continues its unconvincing embrace of Nehruvian non-alignment. This would be directed towards shaping an ongoing debate in Chinese strategic circles over whether India is already in the US camp and is playing a double game by pretending equidistance; or whether New Delhi marches to its own drum. The latter school argues that escalation by China would transform India into a full-scale strategic adversary and create an openly hostile neighbour, just as Mao Zedong's decision to invade India did in 1962.

Military action by India would be painful, but would discourage future trans-LAC incursions by the PLA. If that threat is not nipped in the bud, the already bloated 1.3 million-strong Indian Army would need to add even more personnel, completely derailing its modernisation plans. On the other hand, compelling China into a mutually beneficial border agreement would enable the army to reduce its personnel by 300,000-400,000 men, transforming the financial calculus of defence spending. For this, lives would once again have to be laid down today by a military that is too often taken for granted. But nations pay such prices for safeguarding sovereignty and moulding their strategic environment beneficially. Avoiding these hard choices only postpones the inevitable moment of reckoning.

https://www.business-standard.com/article/opinion/lessons-from-the-yom-kippur-war-120090400049_1.html

hindustantimes

Fri, 04 Sept 2020

To take on China, boost local defence capabilities

To start with, how about focusing on producing an Indian-designed and manufactured personal weapon that will compare with the best in the world by August 2023?

By C Uday Bhaskar

India and China are currently engaged in a low-intensity opaque war (LIOW), and renewed tension has been reported in recent days along the already troubled Line of Actual Control (LAC). These developments have taken place at the southern bank of the Pangong Tso and New Delhi has charged Beijing with attempting a second "provocative action" on August 31, even as talks were being held at the local military commanders' level.

That India is among the world's largest importers of arms is a shameful reality, and it is to the PM's credit that he had acknowledged this fact in his first term (2014) and had sought to enhance the indigenous production of military inventory. (HTPhoto)

Pre-emptive action by Indian troops has evidently foiled any further Chinese intrusions. China has displayed lack of sincerity and engaged in deception. The steady build-up of troops and related inventory by both sides is indicative of heightened military tension, with a probability of skirmishes leading to unintended escalation, and a long winter vigil. For India, the monitoring and safeguarding of the claim line along LAC with China will demand a higher level of sustained military presence.

Against this backdrop, Prime Minister (PM) Narendra Modi's address, at the end of August, on defence manufacturing acquires critical salience, particularly for the candid manner in which the inadequacies and structural flaws of equipping India's military machine were highlighted. He noted, "It is not hidden from anybody that India has been one of the main defence importers in the world for the last several years. When India became Independent, it had huge capabilities in defence production. There was a well-established 100-year-old ecosystem in defence production in India. Not many countries had the resources and potential of India. But it is unfortunate that not much attention was paid on this issue for several decades. No serious attempts were made. But, the situation is changing now".

The PM's statement merits scrutiny in relation to how India will manage the China factor in the long-term from a military perspective. He was right when he referred to a 100-year-old ecosystem since India's first gunpowder factor was set up in Ishapur (Bengal) in 1787 and a modern rifle factory was established by the British in 1904. Slowly, a defence production base was created in India, but only to serve the imperial interest. During World War II, the Indian contribution was considerable by way of war goods — but they were at the lower end of the spectrum and included ammunition, clothing, footwear, animals, among other items.

When the British left India in 1947, this production infrastructure was denuded of its critical human resource and funding; further, it was irrevocably fragmented due to Partition. Lethal stores were destroyed and platforms such as bomber aircraft damaged and rendered non-operational. So the PM's suggestion that India inherited "huge capabilities" apropos defence production at the time of Independence is not accurate. But the PM was spot on that while India had the potential to build a defence industrial base, it was "unfortunate" that no serious attention was paid to this strand of national capability for decades. The onus for this omission lies with those entrusted with the higher defence management. There has been no dearth of reports and recommendations about how to fix the problem but the under performance of the Indian defence manufacturing ecosystem has been overwhelming.

That India is among the world's largest importers of arms is a shameful reality, and it is to the PM's credit that he had acknowledged this fact in his first term (2014) and had sought to enhance the indigenous production of military inventory. However, the empirical truth is that, six years later, the 100-year-old "ecosystem" that the PM referred to has not enabled or nurtured any significant progress in the indigenous design and manufacture of military inventory. The most stark indicator is that India is still floundering with the basic personal weapon for the soldier — the Kalashnikov equivalent — and is dependent on Russia for this item.

Modi 2.0 has another four years to pick up the military equipment gauntlet, and having a full-time defence minister in the seasoned Rajnath Singh is positive. India has to invest in design and research and development in a far more sustained and effective manner, and not succumb to short-term measures such as urgent imports when there is a crisis. This happened in Kargil 1999, and most recently, post-Galwan. The PM has outlined India's indigenous defence manufacturing challenge with commendable candour. The challenge is to irrigate the ecosystem in a manner that will enable India to acquire the appropriate level of military capability and confidence (atma nirbharata) to deal with the China challenge along the LAC and beyond.

To start with, how about focusing on producing an Indian-designed and manufactured personal weapon that will compare with the best in the world by August 2023? That will be the best symbolic gift for India's national security, as the nation completes its 75th independence celebrations.

(C Uday Bhaskar is director, Society for Policy Studies, The views expressed are personal)

https://www.hindustantimes.com/analysis/to-take-on-china-boost-local-defence-capabilities/story-KZbRL4vNkusO3TTaq11e6H.html

hindustantimes

Fri, 04 Sept 2020

India, Russia finalise AK-47 203 rifles deal: Report

There was no official confirmation from the Indian government on the finalisation of the deal

Mosco: India and Russia have finalised a major deal for manufacturing AK-47 203 rifles in India during Defence Minister Rajnath Singh's ongoing visit here, the official Russian media reported on Thursday.

The AK-47 203 is the latest and most advanced version of the AK-47 rifle, which will replace the Indian Small Arms System (INSAS) 5.56x45 mm assault rifle.

The Indian Army has a requirement for around 770,000 AK-47 203 rifles, of which 100,000 will be imported and the rest will be manufactured in India, Russia's state-run Sputnik news agency said.

There was no official confirmation from the Indian government on the finalisation of the deal.

The Indian Army has a requirement for around 770,000 AK-47 203 rifles, of which 100,000 will be imported and the rest will be manufactured in India, Russia's state-run Sputnik news agency said.(Twitter/ANI digital)

The rifles will be manufactured in India as part of the joint venture Indo-Russia Rifles Private Limited (IRRPL), established between the Ordnance Factory Board (OFB), the Kalashnikov Concern and Rosoboronexport -- the Russian state agency for military exports, it said.

The OFB would own a majority stake of 50.5 per cent in IRRPL while the Kalashnikov Group would have a 42 per cent share. Russia's state-owned export agency, Rosoboronexport, would own the remaining 7.5 per cent, the report said.

The 7.62×39 mm Russian weapon will be produced at the Korwa Ordnance Factory in Uttar Pradesh, which was inaugurated by Prime Minister Narendra Modi last year, the report said.

The cost of per rifle is expected to be around USD 1,100, including the cost of technology transfer and of setting up the manufacturing unit, according to the report.

The INSAS, which is use since 1996, has developed some issues such as jamming and magazine cracking at higher altitudes in the Himalayas, the Sputnik report said.

https://www.hindustantimes.com/india-news/india-russia-finalise-ak-47-203-rifles-deal-report/story-44l4TxNcz9ApuWQMbKqgZP.html

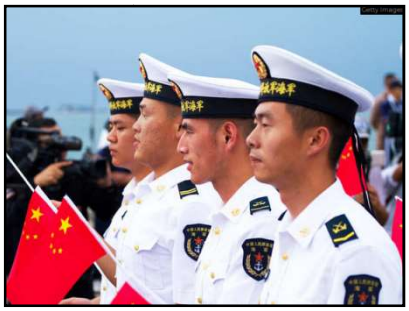
THE ECONOMIC TIMES
WWW.ECONOMICTIMES.COM

Fri, 04 Sept 2020

Chinese naval might threatens Indian Ocean Region balance

Naval might

According to a report by TNN, China now has the largest Navy in the world and is aggressively looking to set up logistical bases in the Indo-Pacific region to enhance its strategic reach, while also working assiduously towards at least doubling the number of its nuclear warheads over the next decade.



Chinese checkers

This is the latest assessment of China's expanding military might, ranging from long-range missiles and nuclear submarines to integrated air defence, space and electronic warfare capabilities, by the Pentagon in its detailed report presented to the US Congress on Tuesday.

Threat to India

India needs to take serious note of the Pentagon report in the backdrop of the expanding Chinese naval footprint in the Indian Ocean Region (IOR), which has been further consolidated after Beijing established its first overseas base at Djibouti on the Horn of Africa in August 2017, while also enjoying unfettered access to the Karachi and Gwadar ports in Pakistan.

Sino-Pak axis

India also needs to worry about the fast-emerging collusive China-Pakistan threat in the IOR, with Beijing set to supply eight Yuan-class diesel-electric submarines, four Type-054A multi-role stealth frigates and other naval platforms and weapons, as was reported by TOI earlier.

Malacca Dilemma

For now, India has a huge advantage in the IOR due to the tyranny of logistics faced by China, and can if required exploit its "Malacca Dilemma". But Indian Navy has a force-level of only one aircraft carrier, 10 destroyers, 14 frigates, 11 corvettes as well as 15 diesel-electric and two nuclear-powered submarines in terms of major combatants at present.

https://economictimes.indiatimes.com/news/defence/chinese-naval-might-threatens-indian-ocean-region-balance/malacca-dilemma/slideshow/77911687.cms

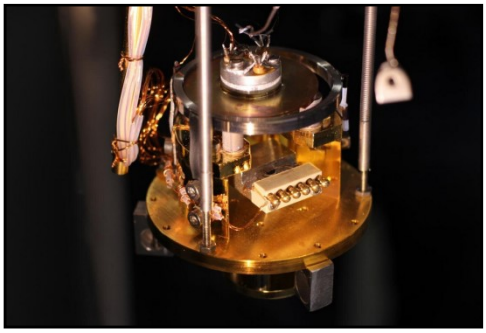
PHYS.ORG

Fri, 04 Sept 2020

Autonomous robot plays with NanoLEGO

Rapid prototyping, the fast and cost-effective production of prototypes or models—better known as 3-D printing—has long since established itself as an important tool for industry. "If this concept could be transferred to the nanoscale to allow individual molecules to be specifically put together or separated again just like LEGO bricks, the possibilities would be almost endless, given that there are around 1060 conceivable types of molecule," explains Dr. Christian Wagner, head of the ERC working group on molecular manipulation at Forschungszentrum Jülich.

There is one problem, however. Although the scanning tunneling microscope is a useful tool for shifting individual molecules back and forth, a special custom "recipe" is always required in order to guide the tip of the microscope to arrange molecules spatially in a targeted manner. This recipe can neither be calculated, nor deduced by intuition—the mechanics on the nanoscale are simply too variable and complex. After all, the tip of the microscope is ultimately not a flexible gripper, but rather a rigid cone. The molecules merely adhere lightly to the microscope tip and can only be put in the right place through sophisticated movement patterns.



Scanning tunneling microscope of the research group around Dr. Christian Wagner (PGI-3) at Forschungszentrum Jülich. Credit: Forschungszentrum Jülich/Christian Wagner

"To date, such targeted movement of molecules has only been possible by hand, through trial and error. But with the help of a self-learning, autonomous software control system, we have now succeeded for the first time in finding a solution for this diversity and variability on the nanoscale, and in automating this process," says a delighted Prof. Dr. Stefan Tautz, head of Jülich's Quantum Nanoscience institute.

The key to this development lies in so-called reinforcement learning, a special variant of machine learning. "We do not prescribe a solution pathway for the software agent, but rather reward success and penalize failure," explains Prof. Dr. Klaus-Robert Müller, head of the Machine Learning department at TU Berlin. The algorithm repeatedly tries to solve the task at hand and learns from its experiences. The general public first became aware of reinforcement learning a few years ago through AlphaGo Zero. This artificial intelligence system autonomously developed strategies for winning the highly complex game of Go without studying human players—and after just a few days, it was able to beat professional Go players.

"In our case, the agent was given the task of removing individual molecules from a layer in which they are held by a complex network of chemical bonds. To be precise, these were perylene molecules, such as those used in dyes and organic light-emitting diodes," explains Dr. Christian Wagner. The special challenge here is that the force required to move them must never exceed the strength of the bond with which the tip of the scanning tunneling microscope attracts the molecule, since this bond would otherwise break. "The microscope tip therefore has to execute a special movement pattern, which we previously had to discover by hand, quite literally," Wagner adds. While the software agent initially performs completely random movement actions that break the bond between the tip of the microscope and the molecule, over time it develops rules as to which movement is the most promising for success in which situation and therefore gets better with each cycle.

However, the use of reinforcement learning in the nanoscopic range brings with it additional challenges. The metal atoms that make up the tip of the scanning tunneling microscope can end up shifting slightly, which alters the bond strength to the molecule each time. "Every new attempt makes the risk of a change and thus the breakage of the bond between tip and molecule greater. The software agent is therefore forced to learn particularly quickly, since its experiences can become obsolete at any time," Prof. Dr. Stefan Tautz explains. "It's a little as if the road network, traffic laws, bodywork, and rules for operating the vehicle are constantly changing while driving autonomously." The researchers have overcome this challenge by making the software learn a simple model of the environment in which the manipulation takes place in parallel with the initial cycles. The agent then simultaneously trains both in reality and in its own model, which has the effect of significantly accelerating the learning process.

"This is the first time ever that we have succeeded in bringing together artificial intelligence and nanotechnology," emphasizes Klaus-Robert Müller. "Up until now, this has only been a 'proof of principle'," Tautz adds. "However, we are confident that our work will pave the way for the robot-assisted automated construction of functional supramolecular structures, such as molecular transistors, memory cells, or qubits—with a speed, precision, and reliability far in excess of what is currently possible."

More information: Philipp Leinen et al, Autonomous robotic nanofabrication with reinforcement learning, *Science Advances* (2020). DOI: 10.1126/sciadv.abb6987

Journal information: *Science Advances*

https://phys.org/news/2020-09-autonomous-robot-nanolego.html

Fri, 04 Sept 2020

Researchers develop low-cost, drop-on-demand printing technique

Researchers at the Center for Nano Science and Engineering (CeNSE), IISc, have developed a low-cost, drop-on-demand printing technique capable of generating a wide range of droplet sizes using a variety of inks. Apart from traditional printing, it could also potentially be useful for 3-D printing of living cells, ceramic materials, electronic circuits and machine components.

Printers used currently—from inkjet printers to bio-printers that dispense living cells—have a nozzle with a small opening to eject droplets. However, particles in the ink or a cell suspension can clog the opening, which limits the amount of particles or cells that can be loaded initially. Consequently, the thickness of the layer that can be printed is also limited.

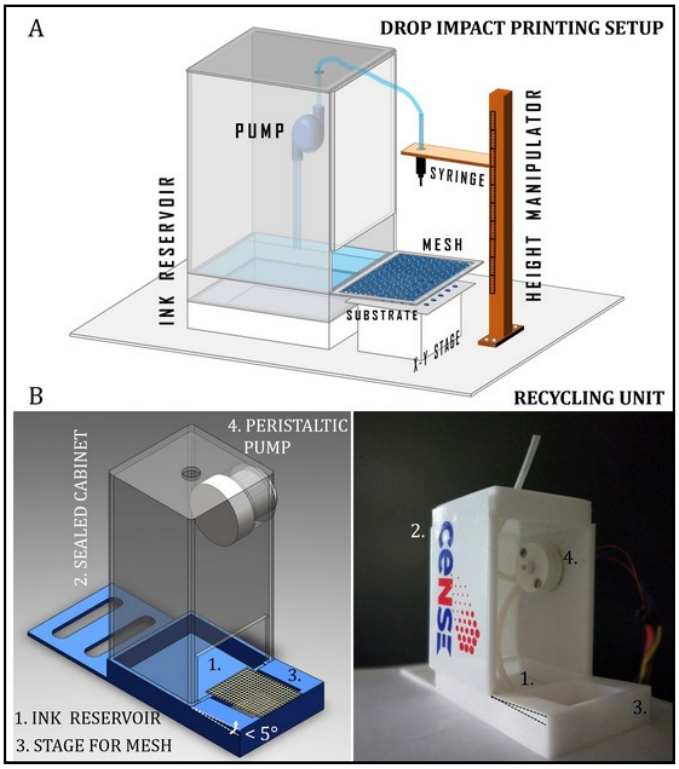
The new technique replaces the nozzle with a mesh covered with chemically treated nanowires that repel water. When a large droplet impacts on this mesh, it bounces back. However, a small part of the liquid is ejected through the mesh pore as a jet that breaks to create a micro-scale droplet, which is then printed onto a surface.

Because of the short contact time of the impacting droplet with the mesh (about 10 ms), the particles in the ink do not get a chance to clog the mesh pore, the researchers say. This allowed them to load the ink with larger quantities of nanoparticles, enabling printing of very thick lines in a single cycle. The mesh can also be easily cleaned and reused.

"The mesh costs only a small fraction of the nozzles that it replaces. This significantly reduces the operational cost when compared to conventional printing techniques," says Prosenjit Sen, Associate Professor in CeNSE and senior author of the study published in *Nature Communications*.

Sen and his lab have been working on developing nanostructured surfaces that can repel water. When large droplets hit such nanostructured meshes at high speeds, jets are ejected. While studying this phenomenon, the researchers found that the velocity of the ejected jet was surprisingly higher than the velocity of the impacting droplet.

"This was the first hint that some mechanism was playing a role in focusing the kinetic energy," says Chandantaru Dey Modak, first author and Ph.D. student at CeNSE. "At this point, we started asking the following questions: What is this focusing mechanism? Can this mechanism be exploited to reliably generate single microscale droplets?"



Drop impact printing setup with recycling unit. Credit: Nature Communications, Microfluidic Devices and Heterogeneous Systems Lab, CeNSE

The team captured high-speed videos (50,000 to 80,000 frames per second) of these impacting droplets, and found that an air cavity was being formed at the droplet center. During the recoil phase of the impact, this cavity collapsed, focusing all the kinetic energy into a single point, resulting in the generation of individual droplets. No "satellite" droplets – secondary droplets that result in unwanted scatter – were generated. The size of the droplets ejected could also be tweaked by adjusting the pore size of the mesh.

The researchers were able to demonstrate the use of this technique for various applications. "Using drop impact printing, we could print 3-D pillars of different sizes, an electronic circuit for semiconductor device applications, and bio-based droplet arrays for cell culture," says Modak. "The capability to print a wide range of droplet sizes while using different kinds of inks for different applications makes this technique unique."

More information: Chandantaru Dey Modak et al. Drop impact printing, *Nature Communications* (2020). DOI: 10.1038/s41467-020-18103-6

Journal information: *Nature Communications*

Provided by Indian Institute of Science

https://phys.org/news/2020-09-low-cost-drop-on-demand-technique.html

PHYS.ORG

Fri, 04 Sept 2020

Near-optimal chip-based photon source developed for quantum computing

Researchers have developed a new CMOS-compatible silicon photonics photon source that satisfies all the requirements necessary for large-scale photonic quantum computing. The research represents a significant step toward mass-manufacturable ideal single photon sources.

There is a widespread effort to develop chip-based quantum computers because the mature CMOS fabrication processes used to make today's computer chips could greatly lower the cost of large-scale quantum information processing. Although researchers have demonstrated many of the components needed to make quantum computers in silicon chips, an on-chip single photon-source has proven challenging because of the stringent demand to create high-quality photons.

Stefano Paesani from the University of Bristol in the UK will present the new research at the all-virtual OSA *Frontiers in Optics* and Laser Science APS/DLS (FiO + LS) conference to be held 14—17 September.

"By demonstrating low-noise photon sources simultaneously meeting all requirements for large-scale photonic quantum computers, we have overcome a crucial challenge that had limited the scaling of quantum photonic technologies," said Paesani. "The techniques developed in this work could speed up the development of mass-manufacturable chip-scale quantum technologies by several years. Such technologies promise enormous computational quantum speed-ups, unconditionally secure communications, and quantum-enhanced sensors."

Creating quality photons

As the name implies, single-photon sources emit light as single photons. They are a key component of optical quantum computers, which use the photons to carry data in the form of qubits. Qubits can be in two states at the same time and will interfere, or correlate, with each other, allowing many processes to be performed simultaneously.

Single-photon sources used in quantum computing have very exacting requirements. They must be highly indistinguishable and pure, either near-deterministic or highly efficient, and suitable for mass-manufacturing. To meet all these requirements, Paesani and coworkers designed a new single-photon source based on inter-modal spontaneous four-wave mixing in a multi-mode silicon waveguide.

The inter-modal approach to on-chip photon sources, where an interplay between multiple optical pump fields is used to generate photons, enables novel degrees of freedom to control the photon emission. By tailoring the geometry of a low-loss multi-mode waveguide and the on-chip temporal delay between the pump fields, the research team showed that the properties of the spontaneous photon emission could be engineered to achieve near-ideal photons.

To test the new design, the researchers fabricated single-photon devices on standard silicon-on-insulator using CMOS-compatible lithography processes on a commercial wafer. Tests of the devices revealed that the multi-mode waveguides significantly reduced transmission losses, enabling an intrinsic heralding efficiency of the source of approximately 90%. A high heralding efficiency is necessary to scale up quantum processing.

The researchers also performed on-chip photon interference, which is essential for quantum computations. These experiments produced a raw-data visibility of 96%, the highest reported so far in integrated photonics. This achievement enables on-chip quantum operations between photons at an unprecedented level of precision, opening the possibility to scale-up low-noise photon processing in near-term quantum photonic devices.

The researchers say that the single-photon source could be further improved with a better pump laser and by using a more uniform fabrication process.

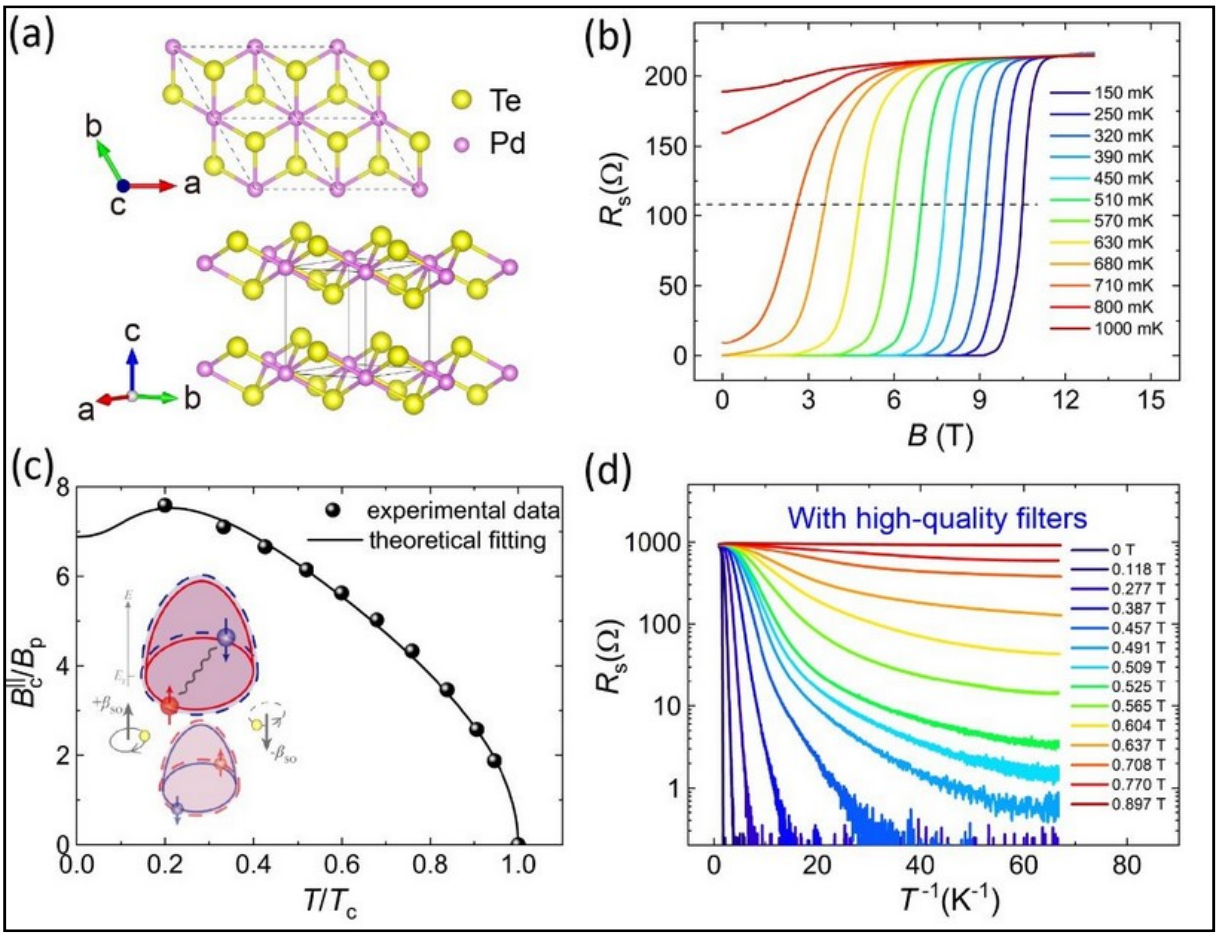
More information: www.frontiersinoptics.com/home/

https://phys.org/news/2020-09-near-optimal-chip-based-photon-source-quantum.html

Fri, 04 Sept 2020

An unusual superconductor

Professor Wang Jian at Peking University and collaborators investigated the superconducting properties of two-dimensional crystalline superconducting $PdTe_2$ films grown by molecular beam epitaxy. They observed the experimental evidence of anomalous metallic state and detected type-II Ising superconductivity existing in centrosymmetric systems. Moreover, the superconductivity of $PdTe_2$ films remains almost the same for more than 20 months without any protection layer. This macro-size ambient-stable superconducting system with strong spin-orbit coupling shows great potentials in superconducting electronic and spintronic applications. The paper was published online in *Nano Letters* and selected for the Editors' Choice of *Science* with a title of "An unusual superconductor" (*Science* 369, 388 2020).



(a) The lattice structure of PdTe2, indicating that it is a centrosymmetric system. (b) The in-plane magnetic field dependent sheet resistance at different temperatures for 6-ML $PdTe_2$ film. (c) The temperature dependence of in-plane critical fields (the black spheres) of 6-ML $PdTe_2$ film, which is consistent with the theoretical formula of Ising superconductivity (the solid black lines). Inset: the schematic of type-II Ising pairing. (d) The lgRS-1/T curves of 4-ML PdTe2 film at different magnetic fields. The resistance drops and then saturates with decreasing temperature, which is the hallmark of anomalous metallic states. High quality filters are used in the measurements to well exclude the influence of high-frequency noise. Credit: This figure is adapted from: https://doi.org/10.1021/acs.nanolett.0c01356

The magnetic field is normally believed to hinder the formation of superconductivity. For most superconducting systems, strong magnetic field can break the superconducting Cooper pairs and destroy the superconductivity. Recently, a new kind of two-dimensional (2-D) superconducting system survives under a large in-plane magnetic field, called Ising superconductors. Previous works suggest that the Ising superconductor requires in-plane inversion symmetry breaking. The broken in-plane inversion symmetry gives rise to Zeeman-type spin-orbit coupling (SOC), which polarizes the electron spins to the out-of-plane direction and leads to a huge in-plane critical magnetic field up to several times of the Pauli limit, normally corresponding to dozens of Tesla. The Pauli limit is defined as the magnetic field required to destroy the Cooper pairs via the spin pair breaking effect in conventional superconductors. Professor Wang Jian and collaborators ever reported the observation of Ising superconductivity in macro-size monolayer $NbSe_2$ films grown by molecular beam epitaxy (MBE) and the interface induced Ising superconductivity in ultrathin crystalline Pb films for the first time.

Recently, Professor Wang Jian and Professor Lin Xi at Peking University, in collaboration with Professor Xue Qikun, Professor Wang Lili, Professor Xu Yong, Professor Yao Hong at Tsinghua University, Professor Liu Haiwen at Beijing Normal University detected a new kind of Ising superconductivity in 2-D crystalline $PdTe_2$ films grown by MBE. The 6-monolayer (ML) (around 3 nm) $PdTe_2$ film exhibits a large in-plane critical field more than 7 times of the Pauli limit, which is the characteristic of Ising superconductivity. Different from the previously reported Ising superconductors, the $PdTe_2$ film keeps the in-plane inversion symmetry, which indicates that there exists a new mechanism of Ising superconductivity (named type-II Ising superconductivity by Professor Wang Jian in discussion with Professor Xu Yong).

Band structure calculation and theoretical analysis reveal that the 3-fold rotational symmetry in the $PdTe_2$ films makes the effective field of SOC along the out-of-plane direction and leads to the out-of-plane spin polarization. The superconducting Cooper pairs formed by the electrons with out-of-plane spin polarization can survive under very large magnetic field parallel to the 2-D system, which gives rise to the type-II Ising superconductivity with large in-plane critical field. Theoretical calculations indicate that for 2-D superconducting systems with in-plane inversion symmetry, 4 and 6-fold rotational symmetry can also make the orientation of the effective SOC field along out-of-plane direction. Thus, the type-II Ising superconductivity can be generalized to various 2-D systems with 3, 4 and 6-fold rotational symmetry. Therefore, the discovery of type-II Ising superconductivity is promising to stimulate a new research direction in condensed matter physics.

Interestingly, under perpendicular magnetic field, the sheet resistance of $PdTe_2$ films drops and then saturates to a temperature-independent constant with decreasing temperature via ultralow temperature transport measurements with high-quality filters. It is the first solid experimental evidence of anomalous metallic states in high-quality 2-D crystalline films grown by MBE, which further reveals that besides superconducting and insulating ground states, anomalous metallic state is another quantum ground state for 2-D Bosonic systems.

Moreover, most 2-D superconducting systems are very sensitive to the atmosphere and easy to lose superconductivity. The superconductivity of $PdTe_2$ films remains almost the same for more than 20 months without any protection layer. This macro-size ambient-stable superconducting system with strong SOC shows great potentials in superconducting electronic and spintronic applications.

More information: Yi Liu et al, Type-II Ising Superconductivity and Anomalous Metallic State in Macro-Size Ambient-Stable Ultrathin Crystalline Films, *Nano Letters* (2020). DOI: 10.1021/acs.nanolett.0c01356

Journal information: *Nano Letters* , *Science*

https://phys.org/news/2020-09-unusual-superconductor.html

PHYS.ORG

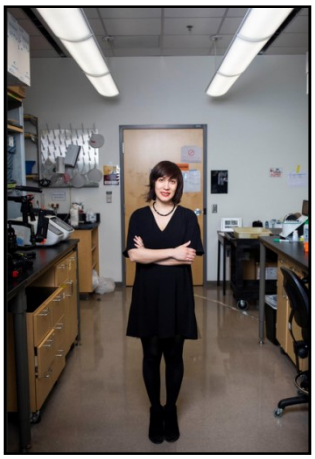
Fri, 04 Sept 2020

Editing immune response could make gene therapy more effective

Gene therapy generally relies on viruses, such as adeno-associated virus (AAV), to deliver genes into a cell. In the case of CRISPR-based gene therapies, molecular scissors can then snip out a defective gene, add in a missing sequence or enact a temporary change in its expression, but the body's immune response to AAV can thwart the whole endeavor.

To overcome that obstacle, researchers at the University of Pittsburgh School of Medicine created a system that uses CRISPR in a different way. Their system briefly suppresses genes that are related to AAV antibody production so the virus can deliver its cargo unimpeded. These results published today in *Nature Cell Biology*.

"Many clinical trials fail because of the immune response against AAV gene therapy," said study co-senior author Samira Kiani, M.D., associate professor of pathology at Pitt and member of the Pittsburgh Liver Research Center (PLRC) and McGowan Institute for Regenerative Medicine (MIRM). "And then you can't readminister the shot because people have developed immunity."



Samira Kiani, M.D, associate professor of pathology, member of the Pittsburgh Liver Research Center and the McGowan Institute for Regenerative Medicine. Credit: University of Pittsburgh

So Kiani and her long-time collaborator Mo Ebrahimkhani, M.D., associate professor of pathology at Pitt, member of PLRC and MIRM, set out to modify gene expression related to the body's immune response to AAV. But this gene is important for normal immune function, so the researchers didn't want to shut it down forever, just tamp it down momentarily.

Since CRISPR is such a convenient system for editing the genome, the pair figured they would put it to use for altering the master switches that orchestrate genes involved in immune response.

"We're hitting two birds with one stone," said Ebrahimkhani. "You can use CRISPR to do your gene therapy, and you also can use CRISPR to control the immune response."

When the researchers treated mice with their CRISPR-controlled immune suppression system and then exposed them to AAV again, the animals didn't make more antibodies against the virus. These animals were more receptive to subsequent AAV-delivered gene therapy compared to controls.

Beyond gene therapy, the study also shows that CRISPR-based immune suppression can prevent or treat sepsis in mice, highlighting the potential for this tool to be broadly useful for a range of inflammatory conditions, including cytokine storm and acute respiratory distress syndrome, both of which can crop up with COVID-19, though more studies are needed to engineer safety features.

"The main goal of this study was to develop CRISPR-based tools for inflammatory conditions," said study lead author Farzaneh Moghadam, a Ph.D. student in Kiani's lab. "But when we looked at bone marrow samples, we saw that the group treated with our tool showed a lower immune response to AAV compared to the control group. That was very interesting, so we started exploring how this tool contributes to antibody formation against AAV and could potentially address safety and efficacy concerns with gene therapy trials."

Kiani cofounded SafeGen Therapeutics with the goal of bringing this technology to the clinic.

More information: Moghadam, F., LeGraw, R., Velazquez, J.J. et al. Synthetic immunomodulation with a CRISPR super-repressor in vivo. *Nat Cell Biol* 22, 1143–1154 (2020). doi.org/10.1038/s41556-020-0563-3

Journal information: *Nature Cell Biology*

https://phys.org/news/2020-09-immune-response-gene-therapy-effective.html

COVID-19 Research News

hindustantimes

Fri, 04 Sept 2020

'India at forefront of research for Covid-19 vaccine', says PM Modi at US-India summit

While coronavirus had impacted several things, it had not impacted people's aspirations and ambitions, PM Modi said at the US-India conference

Edited By Prashasti Singh

New Delhi: Prime Minister Narendra Modi delivered his keynote address at the third leadership summit of the US India Strategic and Partnership Forum (USISPF) on Thursday.

"When 2020 began, did anyone imagine how it would pan out? A global pandemic has impacted everyone. It's testing our resilience, public health system and economic system. The current situation demands fresh mindset where the approach to development is human-centric," the PM said.

Talking about the Covid-19 death rate in India, the PM said that it was one of the lowest per million in the world.

"India, a country with 1.3 billion people and limited resources, has one of the lowest death rates per million in the world. The recovery rate is also steadily rising," said PM Modi at the summit.

He further said that while coronavirus had impacted several things, it had not impacted people's aspirations and ambitions. "In the recent months, there have been far-reaching reforms which are making business easier and red-tapism lesser," the PM added. India is at the forefront of the research for Covid-19 vaccine, he said.

The theme of the 5-day Summit that began on the 31st of August is "US-India Navigating New Challenges".

"Looking forward to address the @USISPForum #USIndiasummit2020. Will be sharing my views on 'Navigating New Challenges.' Do join live this evening, 3rd September, at 9 PM India time," the PM tweeted earlier.

External affairs minister S Jaishankar, commerce and industry minister Piyush Goyal, US vice president Mike Pence, and former top Indian-American diplomat Nikki Haley are some of the key leaders who have participated in the virtual event so far.

According to a release issued by the Prime Minister's Office on Wednesday, the event's theme covers various subjects such as India's potential in becoming a global manufacturing hub, opportunities in India's gas market, ease of doing business to attract FDI in India, common and challenges in tech space, Indo-Pacific economic issues, innovation in public health and others.

The USISPF is a non-profit organisation that works for the partnership between India and the US. *(with agency inputs)*

https://www.hindustantimes.com/india-news/pm-modi-delivers-keynote-address-at-india-us-summit/story-KbCAdswUuEJTNUBATKPqQO.html

JAGRAN English

Fri, 04 Sept 2020

Clinical trial for protein-based vaccine launched; here's a look at COVID-19 vaccines' status in India

Coronavirus Vaccine Updates: So as Union Health Minister says that India will get its first COVID-19 vaccine by end of the year, here's a look at the status of the coronavirus vaccine in the country

New Delhi: The whole world is battling hard against the dreadful coronavirus and is trying to find a cure for the deadly disease that was first reported in China's Wuhan last year. However, researchers and scientists have failed to develop a vaccine for the highly contagious virus that has affected nearly every country in the world.

As the world races to develop treatments against the coronavirus pandemic, French drugmaker Sanofi and its British peer GSK on Thursday announced that they have begun the clinical trial for a protein-based COVID-19 vaccine candidate.

In a statement, the two companies announced that the medicine "uses the same recombinant protein-based technology as one of Sanofi's seasonal influenza vaccines with GSK's established pandemic adjuvant technology", adding that the first result of the vaccine will be out by December 2020. "The initiation of our clinical study is an important step and brings us closer to a potential vaccine which could help defeat COVID-19," Reuters quoted Thomas Triomphe, executive vice president and global head of Sanofi Pasteur, as saying.

Researchers and scientists across the whole world have been battling hard to find a possible treatment for the deadly infection but have failed so far. Amid this Union Health Minister Dr Harsh Vardhan has said that India will get its first coronavirus by the end of the year.

"Three COVID vaccine candidates in India are in the clinical trial phases and rest in the pre-clinical trials and by the end of this year we hope to be able to get a vaccine against COVID," he had said. So as Union Health Minister says that India will get its first COVID-19 vaccine by end of the year, here's a look at the status of the coronavirus vaccine in the country:

Covaxin:

Covaxin, which is India's first indigenous COVID-19 vaccine, is being jointly developed by Bharat BioTech, Indian Council of Medical Research (ICMR) and the National Institute of Virology (NIV). According to Dr E Venkata Rao, principal investigator of the trial at Institute of Medical Sciences and SUM Hospital, Covaxin had 'no side effects' in the phase I trial and the ICMR has said that it is in phase 2 (b) and phase 3 trials.

ZycovD:

Like Covaxin, ZycovD -- which is based on viral DNA -- is a homegrown COVID-19 vaccine. ZycovD has been developed Zydus Cadila and is in phase II clinical trials.

"All the subjects in phase I clinical trial were closely monitored in a clinical pharmacological unit for 24 hours post-dosing for safety and for 7 days thereafter and the vaccine was found to be very safe," Zydus Cadila Chairman Pankaj R Patel had said.

Covishield:

Covishield, which is developed by Oxford University, is manufactured by the Serum Institute of India (SII) in Pune, India. Covishield's advance clinical trial had started earlier. The vaccine has shown promising results in its initial trials and the volunteers did not show any side effects.

https://english.jagran.com/india/coronavirus-vaccine-status-india-latest-updates-covaxin-zycovd-covishield-covid-19-crisis-10016175

The Indian EXPRESS

Fri, 04 Sept 2020

Novel vaccine candidate shows promise against Covid-19, study finds

Scientists at The Ohio State University in the US manipulated a natural cellular process to ramp up levels of two proteins used by the virus to infect other cells, packaged the protein-boosting instructions in nanoparticles and injected them into mice

Washington: An experimental vaccine that boosts the production of specific proteins could be effective against the novel coronavirus that causes COVID-19, according to a study conducted in mice.

Scientists at The Ohio State University in the US manipulated a natural cellular process to ramp up levels of two proteins used by the virus to infect other cells, packaged the protein-boosting instructions in nanoparticles and injected them into mice.

Within a month, the mice had developed antibodies against the SARS-CoV-2 virus, according to the study published on Wednesday in the journal Advanced Materials.

The team experimented with two potential antigens that the novel coronavirus is known to use to cause infection: a spike protein on its surface and a receptor binding domain. (Representational Image)

The technique involves altering specific sequences of messenger RNA, molecules that translate genetic information into functional proteins, the researchers said.

While these sequences are not translated to proteins, the researchers changed their structures to promote higher-than-usual levels of proteins.

The sequences are known as untranslated regions, or UTRs.

Though Phase 3 clinical trials of fast-tracked COVID-19 vaccine candidates are in progress, Yizhou Dong, an associate professor at the Ohio State University, said his lab's platform offers a potential alternative.

"If the current vaccines work well, that's wonderful. In case the field needs this, then it's an option. It worked as a vaccine is expected to, and we can scale this up very fast," Dong said.

"For now, it's a proof of concept — we've demonstrated we can optimise a sequence of messenger RNA to improve protein production, produce antigens and induce antibodies against those specific antigens," he said.

The crux of the method is typical to vaccine development: using snippets of a pathogen's structure to produce an antigen — the foreign substance that triggers an appropriate immune response — and finding a safe way to introduce it to the body.

However, the technique takes antigen design to a new level by making use of messenger RNA UTRs, Dong said.

His lab worked with the two UTRs that bookend the start and finish of protein assembly, functioning as regulators of that process and influencing how the resulting protein interacts with others.

UTRs themselves are strings of nucleotides, the molecules that compose RNA and DNA, the researchers said.

"For our application we tried to optimise the UTRs to improve the protein production process. We wanted as much protein produced as possible — so we can give a small dose of messenger RNA that produces enough antigen to induce antibodies against the virus," Dong said.

The team experimented with two potential antigens that the novel coronavirus is known to use to cause infection: a spike protein on its surface and a receptor binding domain.

The domain is a component of the spike protein that the virus uses to make its way into host cells — a necessary step to make copies of itself.

Both are used in other SARS-CoV-2 vaccine candidates, the researchers said.

After manipulating the messenger RNA for these two proteins, the team encased them in lipid nanoparticles developed previously in Dong's lab.

They injected mice with the experimental vaccine and gave them a booster two weeks later.

A month after the first injection, immune cells in the mice had taken up the antigens of the two proteins and developed antibodies against them.

"It takes some time for the immune system to process the antigens and have cells produce antibodies. In this study, we detected antibodies after 30 days," Dong added.

https://indianexpress.com/article/coronavirus/coronavirus-covid-19-vaccine-research-study-us-6581664/

The Indian EXPRESS

Fri, 04 Sept 2020

New research: Common heart drugs are safe in Covid-19 patients, trial finds

During the pandemic, there have been fears about how these drugs would impact patients with Covid-19

Heart patients commonly take drugs called ACE inhibitors and angiotensin receptor blockers (ARBs) to reduce blood pressure and treat heart failure. During the pandemic, there have been fears about how these drugs would impact patients with Covid-19.

Now, a trial has shown that heart patients hospitalised with Covid-19 can safely continue taking ACE inhibitors and ARBs. The trial results were presented on Tuesday in the European Society of Cardiology (ESC) Congress 2020.

A doctor takes the heart rate and blood oxygenation readings of an asymptomatic Covid-19 patient. (AP Photo/Ariana Cubillos/Image used for representational purposes)

The trial, called BRACE CORONA, enrolled 659 patients in Brazil. It tested two strategies: temporarily stopping ACE inhibitor/ARB for 30 days versus continuing ACE inhibitors/ARBs in Covid-19 patients taking these medications.

The primary outcome was number of days alive and out of hospital at 30 days.

The average number of days alive and out of hospital was 21.9 days for patients who stopped ACE inhibitors/ARBs and 22.9 days for patients who continued these medications.

The average ratio of days alive and out of hospital between the suspending and continuing groups was 0.95. The average difference between groups was -1.1 days.

The proportion of patients alive and out of hospital by the end of 30 days in the suspending ACE inhibitor/ARB group was 91.8 per cent versus 95 per cent in the continuing group.

A similar 30-day mortality rate was seen for patients who continued and suspended the ACE inhibitor/ARB (2.8 per cent versus 2.7 per cent).

(Source: European Society of Cardiology)

https://indianexpress.com/article/explained/common-heart-drugs-are-safe-in-covid-19-patients-trial-finds-6581114/

ScienceDaily

Fri, 04 Sept 2020

Researchers identify proteins that prevent COVID-19 transmission through the placenta

Summary:

Researchers have identified properties in placenta tissue that may play an important role in preventing the transmission of COVID-19 from a mother with the virus to her fetus.

Researchers from Boston Medical Center's Maxwell Finland Laboratory for Infectious Diseases have identified properties in placenta tissue that may play an important role in preventing the transmission of COVID-19 from a mother with the virus to her fetus.

The study results demonstrate that the COVID-19 virus universally invades the placenta in cases with and without evidence of fetal infection, highlighting the protection that the placenta may offer against COVID-19 infection as current data indicates a less than five percent COVID-19 transmission rate in newborns from their mothers. Published in *Placenta*, these results underscore the importance of using placenta tissue in COVID-19 research studies aimed at developing novel ways to diagnose, treat and prevent COVID-19 virus transmission.

For this study, the researchers examined placental tissue, which shares many developmental and physiological similarities with the lung and the immune response of the small and large intestine, making it a key source of human tissue that can be used for ongoing COVID-19 research. It also contains a unique expression pattern of COVID-19 receptors that are different from other organs, which could be helpful in the development of COVID-19 treatments.

"The results of this study provide evidence for ongoing research of COVID-19 infection at the maternal-fetal interface as means to better understand virus transmission and infection in other human tissues," said Elisha Wachman, MD, a neonatologist at Boston Medical Center, associate professor of pediatrics at Boston University School of Medicine, and principal investigator of this study. "Previous research has shown that the placenta protects the fetus from various types of infection, and exploring the particular ways in which it protects the fetus from COVID-19 transmission may help identify new targets of COVID-19 prevention and treatment."

Throughout April and May 2020, samples from 15 COVID-19 positive maternal-fetal dyads were collected for this study; five cases had evidence of fetal transmission. The placental tissue of the positive cases was analyzed and compared with ten COVID-19 negative controls. The researchers found that the COVID-19 virus was present in the placental tissues in cases with and without evidence of fetal infection. They also found that the placenta contains a unique pattern of cell surface proteins (TMPRSS2 and ACE2) that are important for COVID-19 viral entry, which is different from other cell types. The demographics of mother-baby dyads were also studied and no differences were found to be significant, showing the fetal transmission does not discriminate.

"Determining how the placenta could be preventing COVID-19 infections during pregnancy can help provide clues on how to prevent infection in other organs, such as the lungs and gut," said Elizabeth Taglauer, MD, PhD, a neonatologist and placental biologist based at Boston Children's Hospital. "As a readily available tissue for research, the placenta can be a valuable source of scientific study for a variety of human diseases in pregnancy and beyond."

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Journal Reference:

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Children can have both Covid-19 antibodies, virus in their system simultaneously

Children may still have the potential to transmit the novel coronavirus even if they have a measurable immune response, according to a new study which says the virus and antibodies can coexist in young patients

Washington DC: Children may still have the potential to transmit the novel coronavirus even if they have a measurable immune response, according to a new study which says the virus and antibodies can coexist in young patients. The study, published in the Journal of Pediatrics, used a retrospective analysis of 6,369 children tested for the novel coronavirus SARS-CoV-2, and 215 patients who underwent antibody testing at the Children's National Hospital in the US between March 13 and June 21. According to the scientists, including those from the hospital, 33 of the 215 patients had co-testing for both the virus and antibodies during their COVID-19 disease course, with nine of the 33 showing presence in their blood while also later testing positive for the virus.

Health workers in PPE kit playing with a child at the Commonwealth Games (CWG) Village sports complex, temporarily converted into a COVID care center, in New Delhi on Wednesday. (Representational image)(ANI)

"With most viruses, when you start to detect antibodies, you won't detect the virus anymore. But with COVID-19, we're seeing both," said Burak Bahar, lead author of the study from the Children's National Hospital. According to Bahar, the next phase of research will be to test if the virus that is present alongside the antibodies can be transmitted to other people. She added that it also remains unknown if the antibodies detected in the children correlate with immunity, and how long antibodies and potential protection from reinfection last.

When the scientists assessed the timing of viral clearance and immunologic response, they found the average time from viral positivity to negativity, when the virus can no longer be detected, was 25 days. The median time to seropositivity, or the presence of antibodies in the blood, was 18 days, while the median time to reach adequate levels of neutralising antibodies was 36 days. Neutralising antibodies are important in potentially protecting a person from re-infection of the same virus. The scientists also found that patients six through 15 years old took a longer time to clear the virus compared to patients 16 through 22 years old.

Females in the 6-15 age group also took longer to clear the virus than males, they added.

While there is emerging data regarding this timing in adults with COVID-19, the researchers said there is far less data when it comes to the pediatric population. "The takeaway here is that we can't let our guard down just because a child has antibodies or is no longer showing symptoms," Bahar said, adding that the continued role of good hygiene and social distancing "remains critical."

(This story has been published from a wire agency feed without modifications to the text.)

https://www.hindustantimes.com/health/children-can-have-both-covid-19-antibodies-virus-in-their-system-simultaneously/story-6Q50JqzKILvt00KCrsPbDJ.html