

समाचार पत्रों से चयित अंश Newspapers Clippings

दैनिक सामयिक अभिज्ञता सेवा

A Daily Current Awareness Service



रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केन्द्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाऊस, दिल्ली 110054
Metcalf House, Delhi-110054

Private firms miss out on Rs 2,400-cr tank upgrade deal

Defence ministry gives BEL, OFB the contract, ignores Make in India norms of level playing field

By Ajai Shukla

The defence ministry on Saturday ignored its own acquisition rules and policies by awarding the public sector Ordnance Factory Board (OFB) and Bharat Electronics (BEL) a contract for upgrading 693 BMP-2 infantry combat vehicles (ICVs) on a “single-vendor basis”, casting aside competitive tendering.

“The ministry approved the upgrade and modernisation of armoured fighting vehicles in the ‘Buy Indian (Indian designed, developed and manufactured)’ category, at a cost of Rs 2,400 crore,” said authoritative defence ministry sources after a meeting of the apex Defence Acquisition Council. He confirmed the upgrade would be carried out at the Ordnance Factory, Medak, in Telangana.

In awarding the contract to the OFB-BEL combine, the ministry ignored multiple private sector requests for competitive tendering, which would allow private firms to continue their work in developing thermal imagers and integrated fire-control systems for the army’s BMP-2s.

Further violating procurement rules, the OFB-BEL fire control system has been accepted based only on a “performance demonstration” of the BMP-2’s gun. No user trials have been carried out by the army; nor has the BMP-2’s missile firing been demonstrated. No “quality assurance” trials, maintainability trials, electro-magnetic interference trials — all essential under procurement rules — have been conducted.

Ironically, the private sector has developed sophisticated capabilities in these systems. Bengaluru-based, Alpha Design Technologies has upgraded the night fighting capabilities of 969 BMP-2s, fitting them with a “thermal imaging stand-alone kit”. Alpha is currently discharging another contract to fit integrated “thermal imaging fire control systems” in 1,000 of the army’s T-72 tanks.

Business Standard has learnt that Alpha has charged about Rs 2 crore to upgrade each armoured vehicle. Now, without competitive bidding for price discovery, OFB-BEL will be paid almost Rs 3 crore per BMP-2.

“While discharging these orders, Alpha Design Technologies developed sophisticated capabilities in night vision and integrated fire control systems, absorbing technology from Israeli electronics firm Elbit and spending money to set up high-end Make in India manufacturing facilities in Bengaluru,” said Colonel (retired) H S Shankar, who heads Alpha.

Yet, in upgrading the current batch of 693 BMP-2s (the army has a total of 2,750 BMP-2s), the ministry has chosen to ignore Alpha, and with it the entire private sector. In violation of the military’s rulebook for capital acquisitions — the Defence Procurement Procedure (DPP) — the ministry decided that, instead of time-consuming tendering involving multiple vendors, they would make a quick, “single-vendor” procurement from the public sector.

On June 12, FICCI wrote to Defence Minister Arun Jaitley, pointing out the private sector had made a presentation to the ministry on May 29, highlighting their capabilities and asking for three to six months to present their solutions for trials. They also requested for operational BMPs on which they could develop their integrated fire control systems.

“For reasons unknown to industry, the user expressed reservations to provide operational BMPs... citing that there are no policy enablers to loan a BMP...,” the FICCI letter notes.

The letter says the army cited “urgency of upgrade” to argue that “evaluation of industry solution would not be possible within required timelines”, and that “nomination of the OFB is the only way the upgrade can be

recommended". Yet, since 2006, the ministry had issued ten enquiries and two tenders for BMP-2 upgrades, all of them citing "Urgent Operational Requirements", but none were converted into an opportunity for industry. FICCI's letter suggests the ministry could shortlist three to four major private firms with good track records, which could be loaned a BMP-2 each, on which they could develop their solutions in three to six months. To avoid delay, the ministry could process the time-consuming paperwork connected with the procurement. The Union Cabinet is required to endorse the DAC decision. That will be the last opportunity for the private sector to continue its work in this technology realm.

दैनिक जागरण

Sun, 09 July, 2017

चीन से तनातनी पर 'लुक ईस्ट' को मिलेगी नई धार

जयप्रकाश रंजन • नई दिल्ली

चीन के साथ सिक्किम-भूटान विवाद गहराने के साथ ही भारत की लुक ईस्ट नीति को भी नई धार देने की प्रक्रिया तेज हो गई है। जी-20 समूह बैठक के दौरान पीएम नरेंद्र मोदी ने एशिया के तीन ऐसे देशों के प्रमुखों से मुलाकात की है जो चीन की साम्राज्यवादी नीतियों से भयभीत हैं। वहीं, नई दिल्ली में म्यांमार के सेना प्रमुख मिन आंग लाइंग के जोरदार स्वागत की भी तैयारी है। दो महीने बाद भारत व जापान की सालाना बैठक भी है, जिसमें नए रणनीतिक समझौतों का एलान होगा। साथ ही वियतनाम, थाइलैंड और इंडोनेशिया के साथ नए सैन्य अभ्यास की तैयारी भी जोरों पर है।

मोदी ने शनिवार को हैम्बर्ग (जी-20) की बैठक के दौरान जापान के पीएम शिंजो एबे, दक्षिण कोरिया के राष्ट्रपति मून जे-ईन और वियतनाम के पीएम उयेन शुआन फुक से मुलाकात की। भारत की लुक ईस्ट नीति के ये तीनों देश अहम साझेदार हैं। इनके अलावा मोदी ने पांच अन्य देशों के प्रमुखों से

भी द्विपक्षीय मुलाकात की और तमाम आपसी व वैश्विक मसलों पर बातचीत की है। इन देशों के साथ बैठक में परमाणु आपूर्तिकर्ता देशों के संगठन एनएसजी में प्रवेश का मुद्दा भी उठा। जापान, दक्षिण कोरिया और वियतनाम भारत की लुक ईस्ट नीति का अहम हिस्सा हैं और मौजूदा केंद्र सरकार इन तीनों देशों के साथ रिश्तों को नए तरीके से आगे बढ़ाने में जुटी है। कूटनीतिक सर्किल में भारत की तरफ से पूर्वी एशियाई देशों के साथ रिश्तों को नई गर्माहट देने की हो रही कोशिशों को चीन को अलग-थलग करने के तौर पर देखा जा रहा है। इस नीति के परिणाम भी दिखने लगे हैं। पिछले महीने ही जापान की संसद ने भारत को परमाणु तकनीकी व उपकरण देने का कानून पास किया है। सितंबर, 2017 में पीएम शिंजो एबे भारत-जापान की सालाना बैठक में हिस्सा लेने आने वाले हैं जहां परमाणु सहयोग पर आगे का रोडमैप बनेगा। चीन की आक्रामक नीतियों से परेशान वियतनाम ने अब भारत को सीधे संदेश देना शुरू कर दिया है कि

वह द्विपक्षीय रिश्तों को नया आयाम देने को तैयार है। यही वजह है कि चीन की आपत्तियों के बावजूद वियतनाम ने दक्षिण चीन सागर में भारतीय कंपनी ओएनजीसी को दिए गए तेल ब्लॉक की अवधि बढ़ा दी है। इस हफ्ते की शुरुआत में वियतनाम के डिप्टी पीएम व विदेश मंत्री फाम बिन मिन भारत आये थे और यहां उनकी अधिकारियों के साथ 'आपसी रणनीतिक हितों' की रक्षा करने के लिए ठोस कदम उठाने पर चर्चा हुई है। शुरुआती झिझक के बाद म्यांमार की नई सरकार भी अब भारत की लुक ईस्ट नीति को तवज्जो देने लगी है। यही वजह है कि भारत ने म्यांमार के सेना प्रमुख आंग लाइंग का जोरदार स्वागत करने की तैयारी की है। उनकी पीएम मोदी, रक्षा मंत्री अरुण जेटली और एनएसए अजित डोभाल के साथ बातचीत होगी। अभी तक सारे सैन्य साजोसामान चीन से खरीद रहे म्यांमार को भारत भी लुभाने की कोशिश में है। इसके अलावा भारत दक्षिण पूर्वी एशियाई देशों के साथ सैन्य अभ्यास की तैयारियों में भी जुटा है। खास तौर पर इंडोनेशिया, थाइलैंड और वियतनाम के साथ सैन्य अभ्यास की तैयारी है।

Chinese checkers on the Doklam plateau

By Aditi Phadnis

The dispute in the Doklam area is an old one, but the bellicosity of the Chinese official media and its bureaucracy seems calculated to escalate tensions

In a Delhi suburb, owners of a restaurant called Yummy Bhutan (where, by the way, you can get “very tasty Chinese food”) could be echoing China’s sentiments. Yummy Bhutan is exactly how China is looking at Bhutan. And India has made it quite clear that it doesn’t like it.

To misquote Princess Diana (“there were three of us in this marriage, so it was a bit crowded”), there are three in the Doklam stand-off — India, Bhutan and China. The postures are such that South Asia has been plunged into acute anxiety and tension. Worse, there are indications that the Great Game is being played out again.

Like all tensions, it began with boundary and land: 14 countries have land borders with China — Russia, Mongolia, North Korea, Vietnam, Laos, Myanmar, India, Bhutan, Nepal, Pakistan, Afghanistan, Kazakhstan, Kyrgyzstan and Tajikistan. Because of its colonial history, China had territorial disputes with all of them. It has settled its land boundaries with all its neighbours — barring India and Bhutan.

So what do the disputes involve? With Bhutan, it is a matter of 764 sq km of territory. Beijing claims 495 sq km of territory in the Jakurlung and Pasamlung Valleys in north-central Bhutan and another 269 sq km in western Bhutan, comprising the Doklam Plateau. Doklam Plateau abuts Chumbi Valley, which, like Tawang on Bhutan’s eastern border, has enormous strategic significance for China, Bhutan as well as India. If China gets hold of this territory, the military advantage in India’s Northeast might as well be lost to China.

But that’s not all. The understanding between Bhutan and India is that their border disputes are to be settled together, not piecemeal as there is an intrinsic strategic linkage between the two in the Chumbi valley. By annexing the Doklam sector, the Chinese People’s Liberation Army (PLA) will widen the eastern shoulder of Chumbi valley and with the road extension, achieve significant operational and logistical flexibility for a military strike through Chumbi valley towards the Siliguri corridor.

Bhutan is China’s only neighbour that Beijing does not have official diplomatic relations with. This suits India fine. In 1949, Bhutan signed the Treaty of Perpetual Peace and Friendship with India, under which it agreed “to be guided by the advice of the Government of India in regard to its external relations”.

This has underwritten India’s advisory role in Bhutan’s foreign policy making, including relations with China. The India-Bhutan Friendship Treaty, which replaced the 1949 Treaty in 2007, does not require Thimphu to be guided by Indian advice on foreign policy matters. It only requires them to “cooperate closely ... on issues relating to their national interests”. China views India’s treatment of Bhutan as a “protectorate” abhorrent.

But there are legitimate reasons for Bhutan’s fear of China. It watched with silent horror the crushing of the Tibet uprising in 1959, the punishment meted out to followers of Buddhism and the vigorous implementation of a classless society in China. Bhutan has its own ruling elite. Its monastic estates, and estates belonging to the handful of nobility — the Drukpa — were worked by tenured serfs and slaves. Socialism, much less communism, does not come naturally to it. And it has just about managed to cope with a refugee problem: with the Nepalese for instance. It certainly does not want hordes of Tibetan refugees to come streaming into Bhutan.

Like all other countries, Bhutan is changing. Guided democracy introduced in 2008 has put down shallow roots. But because of this, there are people who question Bhutan’s almost blind allegiance to India and argue

that third country domination in Sino-Bhutan relations (such as they are) is not desirable. The signals of the changes were first out there for everyone to see when Jigmi Thinley, Bhutan's first prime minister, met the then Chinese Premier, Wen Jiabao, on the sidelines of the climate summit at Rio de Janeiro in Brazil in June, 2013. India was kept out of the loop.

An official People's Republic of China (PRC) release quoted Thinley as saying Bhutan wished "to forge formal diplomatic ties with China as soon as possible." China responded with a statement that it was ready to settle the border issue with Bhutan. After initial consternation, India's response was ruthless and swift — and very visible. Loans were held back and vehicle imports from India to Bhutan were stopped. Kerosene and LPG subsidies were held back. All this only strengthened China's resolve to do something about the situation.

Strengthen the borders

Phunchok Stobdan, former ambassador and expert on Asian affairs, says the tension in Doklam should be seen in a wider perspective. "A solution to this would be back-channel talks (at the G20 summit in Hamburg that Donald Trump, Narendra Modi and Xi Jinping attended)," he says. "I don't see any real threat of a war. India should increasingly look to strengthen its borders, especially make sure that there is no incursion into Siliguri."

But the bellicosity of the Chinese official media and its bureaucracy seems calculated to escalate tensions. Says former Indian ambassador to China, Nirupama Rao, "The dispute in the Doklam area is known. It is not a new phenomenon. But China's road construction is a deliberate move to trigger a response from Bhutan and from India."

She adds, "Through its actions, China seeks to impose its own definition of the trijunction point of the boundary between Bhutan, China and India (Sikkim). The move has serious security ramifications for both Bhutan and India's defence interests."

Most professional diplomats counsel prudence, ironically, when for the first time under Modi India has somewhat ostentatiously tried to demonstrate that it can stand up to China (remember the toothache remark when Premier Xi Jinping visited Gujarat in 2014?). On the other hand, almost all experts say that the standoff in Doklam is not a one-off event.

Says R S Kalha, former foreign service officer and China expert, "In my experience of dealing with the Chinese for over 15 years, including leading the Indian side for the crucial boundary sub group, I have never experienced that Chinese PLA takes steps without approval."

Defusing tensions

So what are India and China going to do? Already there are signs that both sides are stepping back from the brink. A statement by a Chinese Foreign Ministry spokesman says the Mansarovar yatra of Indian pilgrims, which was halted because of action "of India soldiers on Chinese soil", could be reconsidered via another route. The Indian foreign office is imploring journalists, experts and anyone who will listen that bellicosity and aggression will achieve nothing: professionals are on the job of defusing tensions and they should be allowed to do their work unhindered.

But this is not a WWF match where the outcome is known to everyone. Suddenly the sands are shifting and even friends are acting strange. Ancient words of wisdom might work best here: "When in doubt, don't."

"The dispute in the Doklam area is not a new phenomenon. But China's road construction is a deliberate move to trigger a response from Bhutan and from India" NIRUPAMA RAO Former Indian Ambassador to China

मिसाइल रोधी प्रणाली का परीक्षण करेगा अमेरिका

वाशिंगटन, 8 जुलाई (एएफपी)।

अमेरिका जल्द ही बैलिस्टिक मिसाइल रोधी प्रणाली थाड का परीक्षण करेगा। इससे कुछ दिन पहले उत्तर कोरिया ने अमेरिकी राज्य अलास्का तक मार करने वाली मिसाइल का परीक्षण किया था।

टर्मिनल हाई एल्टीट्यूट एरिया डिफेंस (थाड) प्रणाली अपनी अंतिम चरण की उड़ान के दौरान छोटी और मध्यम दूरी की बैलिस्टिक मिसाइलों को रोकने और नष्ट करने में सक्षम है। अमेरिका की मिसाइल डिफेंस एजेंसी ने बताया कि अलास्का के कोडियाक में पैसिफिक स्पेसपोर्ट कॉम्प्लैक्स से एक बैलिस्टिक मिसाइल को निशाना बनाकर यह परीक्षण किया जाएगा।

एमडीए ने एक बयान में कहा, 'थाड जुलाई के शुरुआती दिनों में थाड इंटरसेप्टर रॉकेट के साथ लक्ष्य का पता लगाएगा और उसे अपने निशाने पर लेगा।' ऐसे परीक्षणों की योजना कई महीने पहले ही बना ली जाती है लेकिन यह परीक्षण ऐसे वक्त हो रहा है जब उत्तर कोरिया ने मंगलवार को

● उत्तर कोरिया के मिसाइल परीक्षण पर अमेरिका की है यह जवाबी कार्रवाई

अलास्का समेत अमेरिका के कई हिस्सों तक मार करने में सक्षम अंतरमहाद्वीपीय बैलिस्टिक मिसाइल का पहली बार प्रायोगिक परीक्षण किया था।

थाड आइसीबीएम मिसाइल को रोकने में सक्षम नहीं है। यह काम जमीन आधारित मिडकोर्स डिफेंस (जीएमडी) इंटरसेप्टर प्रणाली पर छोड़ दिया गया है। अमेरिकी सेना ने इस साल की शुरुआत में दक्षिण कोरिया में थाड को तैनात करना शुरू कर दिया था और उसके इस कदम पर चीन ने नाराजगी जाहिर की थी।

चीन का कहना है कि इस तैनाती से कोरियाई प्रायद्वीप में स्थिति और अस्थिर होगी। अमेरिकी थाड बैटरियों को गुआम और हवाई में भी लगाया गया है जो उत्तर कोरिया से आ रही मध्यम दूरी की मिसाइल को रोकने में सक्षम हैं।

Business Standard

Sun, 09 July, 2017

Pyongyang threat: US bombers conduct drill in South Korea

The B-1B Lancers conducted an air-to-surface firing drill near the border with North Korea

By Heejin Kim

Two US strategic bombers led a joint military exercise in South Korea on Saturday in response to this week's launch by North Korea of an intercontinental ballistic missile capable of striking Alaska.

The B-1B Lancers, deployed from the US base in Guam, conducted an air-to-surface firing drill in Gangwon province, near the border with North Korea, the US Air Force said in a statement. They were joined by South Korean F-15 and US F-16 fighter jets. The mission was in response to the "increasingly escalatory actions" by North Korea including the firing of an ICBM, the Pacific Air Forces said.

North Korea's first confirmed test of an intermediate-range ballistic missile is becoming a key test of President Donald Trump's vow to stop Pyongyang's weapons programs. US officials said this week the weapon could

be capable of flying as far as 5,500 km, enough to put Alaska within the range of an attack. While the response by the US military is to a certain extent a show of force, the firing drill was unusual, according to Koh Yu-Hwan, a professor of North Korean studies at Dongguk University.

“The revealing of the drill by bombers is saber-rattling by South Korea and the US against the launch of the ICBM,” Koh said. “This time, the bombers carried out a firing drill, which is unusual.”

The drill was aimed at precision strikes against core military facilities of the enemy, including a launch pad for a ballistic missile, according to a South Korean Air Force statement. On their way to return to the Guam base, the US bombers joined Japanese fighter jets and carried out a drill over the East China Sea, the US said.

पंजाब केसरी

Sun, 09 July, 2017

यूएन में परमाणु समझौता पारित

122 देशों ने दी मंजूरी भारत, अमेरिका, चीन समेत परमाणु संपन्न देशों ने किया किनारा

न्यूयार्क, (वार्ता) : जर्मनी के हैम्बर्ग में विश्व की 20 बड़ी अर्थव्यवस्थाओं वाले देश जहां तो आतंकवाद और संरक्षणवाद से मिलकर मुकाबला करने की रणनीति बनाते रहे वहीं इनमें से कई प्रमुख देशों ने न्यूयार्क में संयुक्त राष्ट्र मुख्यालय में दुनिया के 120 से अधिक देशों द्वारा परमाणु हथियारों के बहिष्कार के लिए तैयार की गयी एक अहम संधि के लिए बुलाए गए सम्मेलन से किनारा किया। संयुक्त राष्ट्र मुख्यालय में शुक्रवार को आस्ट्रिया, ब्राजील, मेक्सिको, दक्षिण अफ्रीका और न्यूजीलैंड की पहल पर दुनिया के 122 देशों ने परमाणु हथियारों के बहिष्कार की एक अहम संधि के प्रस्ताव को मंजूरी दी। एक मात्र देश न्यूजीलैंड ने इसका विरोध किया जबकि जी-20 देशों में परमाणु

शक्ति संपन्न नौ बड़े देशों भारत, रूस, अमेरिका, ब्रिटेन, चीन, फ्रांस, पाकिस्तान, इजरायल और उत्तरी कोरिया मतदान के समय अनुपस्थित रहे। सबसे हैरानी की बात यह रही कि 1945 में द्वितीय विश्व युद्ध के समय हिरोशिमा और नागासाकी पर बम हमले के कारण परमाणु हथियारों की सबसे बड़ी विभीषिका झेलने वाले जापान ने भी सम्मेलन का बहिष्कार किया। संयुक्त राष्ट्र में अमेरिका, ब्रिटेन और फ्रांस के राजदूतों ने एक साझा बयान जारी कर कहा कि उनका देश कभी इस संधि का हिस्सा नहीं बनना चाहता क्योंकि यह समझौता अंतर्राष्ट्रीय सुरक्षा के पहलुओं को नजरंदाज करता है। नीदरलैंड्स के अलावा सभी नाटो सदस्य देशों ने इस संधि का बहिष्कार किया। नीदरलैंड्स के

पास अपना कोई परमाणु हथियार नहीं है लेकिन उसकी जमीन पर अमेरिका के परमाणु हथियार जरूर तैनात हैं। सम्मेलन की अध्यक्षता कर रही एलेन गोमज ने समझौते को ऐतिहासिक बताते हुए कहा, परमाणु हथियारों से इस दुनिया को मुक्त करने की दिशा में हमने आज पहला बीज बोया है। हम आज यह कह सकते हैं कि अब परमाणु हथियारों से मुक्त दुनिया का सपना साकार हो सकता है। हिरोशिमा और नागासाकी पर परमाणु बम हमले के बाद से पिछले 70 सालों से दुनिया परमाणु हथियारों के बहिष्कार के लिए इस तरह की एक बड़ी संधि का इंतजार कर रही थी। प्रस्तावित समझौते में सदस्य देशों ने परमाणु हथियारों के विनाश, परीक्षण, विनिर्माण, भंडारण, परमाणु

प्रौद्योगिकी के हस्तांतरण और दूसरों के खिलाफ इसके इस्तेमाल पर पूर्ण रोक लगाने की प्रतिबद्धता जतायी है। इसके साथ ही इसमें दुनिया के बड़े परमाणु शक्ति संपन्न देशों से भी परमाणु हथियारों के परीक्षण और इस्तेमाल से दूर रहने के लिए दबाव बनाने की व्यवस्था की गयी है। संयुक्त राष्ट्र में 122 देशों की सहमति मिलने के बाद इस समझौते पर 20 सितंबर को हस्ताक्षर किए जाएंगे। अंतर्राष्ट्रीय कानून का रूप लेने के पहले संयुक्त राष्ट्र के 50 देशों द्वारा इसका अनुमोदन किया जाना आवश्यक होगा।

THE HINDU

Sun, 09 July, 2017

Twenty-five giant radio galaxies found

By Shubashree Desikan

Nearly 200 such candidates were found

A team of six scientists has discovered the presence of a large number of what are known as giant radio galaxies (GRGs) across the universe. Such galaxies are, as the name suggests, huge, and the smallest one in this batch that has been discovered could be big enough to hold 33 copies of the Milky Way placed next to each other. The galaxies have a supermassive black hole, which could be even billions of times as massive as the

Sun, at their centre. Jets of charged particles are ejected from this black hole at very high speeds, close to that of light. In fact, the jets reach out to a distance even larger than the giant galaxies which host them, making the galaxy prominent when imaged with a radio telescope.

Nearly 200 new GRG candidates spread across the sky were found by the six researchers, most of whom were in institutes in Pune. “Twenty-five select galaxies are published in this work. [The] Rest will be published soon. Some are followed up for further studies with our own Indian radio telescope — the Giant Metrewave Radio Telescope (GMRT) located near Pune, India,” says Pratik Dabhade, who is a PhD student of Joydeep Bagchi of IUCAA in Pune, and is an author of the paper, published in *The Monthly Notices of the Royal Astronomical Society*.

In order to discover the 200 GRGs, Pratik and colleagues had to search carefully through 300 big radio images from the NRAO VLA Sky Survey, taken nearly two decades ago, From this they identified candidate GRGs and then further searched the (optical) host galaxies by poring over the literature.

What started off as a Master’s thesis problem for Pratik grew into a project with six people getting involved.

This is, however, not the first detection of a GRG by Indian astronomers. “There was the previous detection of a single GRG from India in 2015-16 using GMRT. It was special because it was found at a very long distance from us,” says Pratik in an email to *The Hindu*.

He also describes the significance of the discovery thus: “Since GRGs extend to Mpc [megaparsec] scales (which is almost the size of a galaxy cluster), they can be used as a probe of the medium between galaxies and clusters of galaxies. Finding them at a larger distance from us means finding them in the older universe. GRGs are very useful in understanding the growth and evolution of radio galaxies.”



Sun, 09 July, 2017

IISc works to make a common antibiotic more effective against TB

By R. Prasad

Augmentin combines an antibiotic and an inhibitor, thus being effective against TB

Bacteria develop resistance against a drug only when they are exposed to it or when the drug is misused. But now, a team of researchers from India has found whether and how drug resistance can develop against a candidate drug called Augmentin even before the drug is approved for treating patients with drug-resistant TB. Augmentin is currently undergoing clinical trials in patients with drug-resistant TB; it is already being used for common bacterial infections.

Besides deciphering the mechanism by which TB bacteria can develop resistance against Augmentin, the researchers have found ways of overcoming this potential resistance mechanism, thereby making Augmentin a potentially powerful drug to treat both multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB).

The beta-lactam class of antibiotics such as penicillin, ampicillin and amoxicillin is one of the most widely used class of antibacterial drugs. Despite its ability to kill several types of bacteria, the beta-lactam antibiotics have never been used against TB bacteria. This is because TB bacteria are naturally resistant to this class. TB bacteria inherently produce an enzyme called beta-lactamase which breaks down beta-lactam class of antibiotics (through hydrolysis) and makes the drug ineffective against TB disease.

Making of Augmentin - One of the strategies of getting around using the beta-lactam class of antibiotics is developing an inhibitor against beta-lactamase enzyme. Clavulanic acid is one such inhibitor, which blocks the

beta-lactamase enzyme. Augmentin, which is a combination of a beta-lactam antibiotic (amoxicillin) and beta-lactamase inhibitor (clavulanic acid), can thus be an effective drug against TB bacteria.

“Till now no one knew the exact mechanism of how the combination of beta-lactam and beta-lactamase inhibitor was killing TB bacteria and how resistance against the combination can emerge in future,” says Dr. Amit Singh from the Centre for Infectious Disease Research at the Indian Institute of Science (IISc), Bengaluru, and the corresponding author of the paper published in the journal eLife. “Our study was able to provide insights into how resistance against Augmentin can emerge.”

The team used integrated experimental technology and computer tools to understand the mechanism by which resistance against Augmentin can set in.

Deciphering the mechanism - The first thing that the researchers asked was how the TB bacterium senses the presence of the drug combination in and around it. “We found the bacterium when exposed to this drug combination changes its metabolism and respiration, which led to the production of sub-lethal amount of reactive oxygen species (ROS). The ROS acts as a danger signal for the bacteria to mount a defence mechanism against Augmentin,” Dr. Singh explains.

The defence mechanism is through a protein called WhiB4, which is normally present in bacteria and is responsible for regulating the production of beta-lactamase enzyme. When the WhiB4 protein senses the ROS signal, it produces large amounts of beta-lactamase enzyme in the TB bacteria. “This could be one method by which the bacteria can become resistant to Augmentin,” Dr. Singh says.

Besides producing beta-lactamase enzyme, the WhiB4 protein also controls the production of an antioxidant molecule called mycothiol. The main role of mycothiol is to reduce the excessive increase in ROS so that ROS level is kept in balance; excessive ROS can kill bacteria by damaging proteins, DNA, and cell wall lipids.

“The WhiB4 protein can detect the ROS signal produced by antibiotics and direct the production of both beta-lactamase and mycothiol, which work together and contribute to bacterium’s ability to resist augmentin,” says Saurabh Mishra from the Centre for Infectious Disease Research at IISc and the first author of the paper.

Making Augmentin powerful - The researchers demonstrated that it is possible to kill MDR-TB and XDR-TB by simply changing the levels of the regulator, WhiB4, and/or increasing the ROS levels inside the bacteria. “When we knocked out mycothiol production, the level of ROS increased inside the bacteria and ultimately resulted in efficient killing of drug-resistant TB bacteria,” he says.

There are certain antibiotics (such as clofazimine) that work by increasing the ROS levels inside bacteria. The researchers are currently testing if using such antibiotics along with Augmentin can efficiently kill drug-resistant TB bacteria. Augmentin and clofazimine antibiotics can together elevate the production of ROS. The excessive ROS inside the bacteria can then kill all forms of drug-resistant TB bacteria.



Sun, 09 July, 2017

Cocoa: A tonic for cognition and memory retention

By D. Balasubramanian

This third-in-line beverage tops the other two, coffee and tea, in health benefits, yet it has not become as popular

Coffee and tea came to be popular in India essentially due to colonial history. They are both imports into our country, and we now grow them in large plantations. Today, Darjeeling Tea and Coorg Coffee are world famous and coveted. Yet, an equally popular drink, cocoa, has not become that popular. All we do is, pretty much to eat it in the solid, processed form as chocolate bars, but not as a “Cuppa.”

Colonial history has a role in the popularisation of cocoa too, but elsewhere. Cocoa was first discovered and coveted by the Mayan civilisation of Central America. The Mayans gave the plant (and its seeds) the name

cocoa (or cacao), meaning ‘The Food of the Gods’. Cocoa seeds were used in family and community functions, and even used as currency. The Aztec Indians there made a drink with cocoa powder, chilli, musk and honey, calling it *Chocolatl* or “beaten drink”; hence the name chocolate.

When the Spanish colonised much of the Americas, they popularised and monopolised cocoa, making its production a well guarded secret as they brought it to Europe. Cocoa became the drink of the super rich. A lot of romance and class was associated with it. Love songs, courting the beloved, were written and sung (and are still done) in Europe and America. (For example, you can enjoy watching Doris Day singing “A Chocolate Sundae on a Saturday Night” on Youtube). But as the Industrial Revolution made machines popular, the grinding of cocoa seeds in large amounts and making them available to “all and sundry” made cocoa or hot chocolate lose their fancy.

Only 3 million tons - Today, while 10 million tons of coffee and 5 million tons of tea are produced yearly across the world, cocoa has a production of about 3 million tons. Yet, this third-in-line beverage tops the other two in health benefits. Indeed, much to the consternation of many in South India, we need to point out that coffee is a “drug,” albeit a mild one, because of the caffeine it contains. Because of this, many people have taken to drinking “decaf” coffee (which is neither here nor there!). Tea, on the other hand, is now recognised to be a health drink, with its content of molecules of the so called flavonoid family acting as antioxidants and cell-protecting molecules (True, it too has caffeine and theobromine, but much less than coffee). But it is cocoa that tops the list as the healthiest drink. Yet it has not become as popular as tea and coffee — a quirk of history based on who our colonials were!

Over the years, it has become increasingly clear that cocoa and chocolates not just good to taste, but are good for cognition as well. Of particular interest is a paper published by Valentina Socci and colleagues, titled “Enhancing human cognition with cocoa flavonoids,” which has appeared in the journal *Frontiers in Nutrition*, 16 May 2017 (free access). The authors point out that the family of flavonoids (catechins, quercetin, anthocyanidins) present in cocoa not only act as antioxidants and cell protectants just as tea does, but they protect human cognition, counteract cognitive decline and memory loss as well. In other words, they act directly on the nervous system of the body and the brain. The Socci paper above quotes several earlier works, both relating to the basic biology of the flavonoids in improving health and cognition, but also about a dozen trials involving human volunteers, many of whom show improved working memory, in addition to improvement in blood pressure and insulin resistance.

Cocoa and cognition - An Italian group led by Dr. G. Desideri has conducted randomised controlled human trials, and found benefits in cognitive function, blood pressure and the metabolic profiles of elderly subjects with mild memory impairment. They call these studies the Cocoa, Cognition and Aging (CoCoA) study.

What are the molecular underpinnings involved in the mechanisms contributing to learning and memory? An earlier paper by Dr. J.P.E. Spencer, in the journal *Proc. Nutr. Soc.*, 2008, on the control of long-term potentiation and memory lists a series of proteins and enzymes, and how these plant flavonoids reach the brain, crossing the blood-brain barrier, and effect their action. While the exact modes of action are yet to be clarified, it appears that they may protect neurons against damage, reduce inflammation, promote and even generate new connections between nerve cells.

An editorial in the *American Journal of Clinical Nutrition* in 2015 agrees with much of the conclusions drawn on the positive effects of cocoa on memory retention and gain, and points out that unsweetened and unprocessed dark cocoa powder would be the best, while that processed with alkali (which is paler, and more common in candy-bars) is less effective. It is estimated that 100 grams of the usual dark chocolate contains about 100 mg of flavonoids, while 100 mg of unsweetened and unprocessed cocoa powder may have as much as 250 mg.

Should one then quit coffee in the morning and go for dark cocoa powder? A friend (whose name skips me for the moment) has suggested that I drink a cup of cocoa every day, along with the morning coffee and the afternoon tea, and perhaps include a glass of red wine in the evenings, so as to maximise benefit — sound advice!