Genome-wide identification and characterization of novel non-coding RNA derived SSRs in wheat

In the current study, scientists at DBT- National Agri-Food Biotechnology Institute (NABI), Mohali has identified a total of 661 SSRs dwelling in pre-miRNA (15), small nuclear (25) and long non-coding RNA (621). Of these, 46 were validated and 100% amplification success was observed in selected wheat genotypes. A set of 36 ncRNA-SSRs markers was utilized for genetic variability assessment in forty-eight Indian wheat genotypes (which includes bread wheat, durum wheat and relatives).

Number of alleles ranged from 1-4 with an average of 2 alleles per SSR locus. Mean PIC, observed heterozygosity and Shannon information index was found to be 0.258, 0.37 and 0.476 which suggests markers to show moderate to high polymorphism. Thirty-six ncRNA-SSRs showed transferability ranging from 42.1% to 100%. Average genetic dissimilarity among wheat genotypes was found to be 0.29 based on Jaccard's dissimilarity.

This is the first report of ncRNA-SSRs in wheat which will be useful for molecular breeding and genetic improvement of wheat. The work was published in the journal '*Molecular Biology Reports*'

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01B_4Aug2020.pdf

Pea plants may manipulate soil microbes to facilitate nutrient uptake & combat stress

Researchers at National Centre for Cell Science (DBT-NCCS), Pune, an autonomous institute of the Department of Biotechnology (DBT), studied long-term exposure to various agricultural practices, such as tillage and residue management on bacterial community in the soil. They also investigated how the rhizosphere microbiome is influenced by the use of the pea plant as a rotation crop. They found that soil and residue management practices affect the structure of the bacterial community in the bulk soil, as well as the pea rhizosphere.

Pea plants were found to be a dominating selection factor that influenced the soil microbiome under different tillage and residue management treatments. Interestingly, these studies revealed that the pea plant rhizosphere had higher numbers of bacteria that can produce plant growth-promoting substances, and those which have the ability to remove toxic elements from the soil. This led to the inference that the pea plants likely shape the microbial community around their roots in a way that may help them with nutrient uptake, and enable them to combat stress and grow in unfavourable soil conditions, which would be advantageous when growing in the acidic and iron-rich soils of this region. These findings were published in the journal, Frontiers in Microbiology. The insights gained from these studies could prove valuable in designing long-term conservation agriculture strategies for the improvement of soil quality and crop yield in the north-eastern regions of India.

Legumes, such as peas, beans and chickpea, have a symbiotic association with nitrogen-fixing bacteria, which are necessary for the plants' growth. These plants have specialized structures on their roots, called nodules, inside which these bacteria reside and fix nitrogen, which also helps increase the fertility of the soil. In addition to the bacteria in these nodules, other microbes present in the soil also affect plant growth, especially those present in the rhizosphere, the region immediately surrounding the roots. The different types of microbes present in the soil collectively constitute the soil microbiome, and those close to the roots constitute the rhizosphere microbiome. Since soil microbial communities, especially the rhizosphere microbiome, significantly influence the growth and productivity of plants, they are vital indicators of soil quality.

The soil microbiome is highly sensitive to agricultural soil management practices. Therefore, a sustainable system of agriculture that promotes optimal crop productivity with minimal impact on the environment, including the soil, is preferable. Approaches like conservation agriculture (CA) are considered as better alternatives for improving crop productivity since they help preserve and enrich the agroecosystem concomitantly. CA involves the use of various strategies, including crop rotations and diversification of cropping systems, and minimal soil disturbance. In long-term conservation agriculture experiments conducted in the acidic soils of northeastern India, various strategies are being tested on experimental farms. This includes the use of legume crops like pea in rotation with rice cultivation.

To be able to modify agricultural methods optimally, it is important to understand how the various practices used influence the soil microbiome in the short- and long-term, and what their consequent effects on the growth, health and productivity of the crops are. Studies done in North Eastern India have shown the impact that reduced tillage can have on soil quality and crop productivity, for example. However, the influence on soil microbial communities had not been investigated.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01B_29July2020.pdf

Neddylation negatively regulates promotion of breast cancer tumorigenesis and progression

The cancer research group at DBT-Institute of Life Sciences (ILS), Bhubaneswar has found some important observations linking the promotion of tumorigenesis and progression in breast cancer. The group headed by Dr. Sandip Mishra at ILS has observed that a protein neddylation inhibitor, MLN4924 can be a novel and effective strategy for breast cancer treatment.

They have reported for the first time that the estrogen related receptor beta (ERRβ) is down regulated primarily at the protein level in breast cancer, and the neddylation inhibition by MLN4924 causes an increase in ERRβ and a decrease in the proliferative potential and clonogenicity of breast cancer cells. They also confirmed that ERRβ limits the proliferation and clonogenicity of breast cancer cells, hence delineating a molecular mechanism of ERRβ down regulation and have indicated that MLN4924 can be used to restore the expression of ERRβ. Restoration of ERR beta expression leads to inhibition of cancer growth and migration.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01B_30July2020.pdf

Eco-friendly washing solutions for fruits and vegetables

The coronavirus pandemic has changed the lives of people across the world. To prevent the spread of coronavirus, experts have consistently recommended cleaning and disinfecting of surfaces and objects, including food items. Although there is no concrete evidence that the virus is transmitted through food, it is recommended that fruit and vegetables be washed properly before consumption. Pesticides have also been used in abundance in recent years to increase the yields in the agricultural sector.

Spraying alcohol-based sanitizers on our food is not an option, nor is it possible to wash them with soap and detergents. Natural cleaning solution for fruit and vegetables is the best thing available right now. BIRAC supported startup Green Pyramid Biotech Pvt Ltd has developed a liquid washing solution called Evergreen & Bioclean Liquid washing solutions for fruits and vegetables. This patented formulation is developed from natural, biodegradable food-grade materials with regulatory approvals.

The products are available in the market under the name “Evergreen Insta Veg and Fruit Wash” and “Bioclean splash of Goodness.” This washing solution helps remove chemicals, pesticides, pathogens and other foreign materials from the surface of fruits and vegetables, resulting in their extended shelf-life and rendering them completely safe for consumption. This product acts as a strong anti-microbial and antifungal agent, eliminating microorganisms and fungus from the fruits and vegetables making it safe for processing and consumption.

This cleaning solution is quick and easy to use. All you have to do is dilute 2 cups of the evergreen solution in 1 litre of water and dip all the fruits and veggies in it for 2-3 minutes. Rub them thoroughly, drain the water and use them directly.

The evergreen washing solution is ideal for home use, hotels, hospitals, caterers, vegetable vendors and distributors while bioclean is more ideal for farm use; especially for exports, long distance transportation, storage and retailing. The product is affordable and comes in a range of packaging, starting from 100ml to 5 litres. Chemical-free products such as Evergreen & Bioclean remove germs and chemicals with minimal effort and ensure safe eating.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01S_30July2020.pdf

DBT programme helps make genome editing tools delivery more efficient

Genome editing offers great potential for developing treatment for various rare and genetic diseases that were hitherto untreatable. However, there is a need for an efficient and precise delivery system to ensure therapeutically relevant efficiency of the intended genome modifications to facilitate transfer of the gene editing technology to clinics.

A new study supported by the Department of Biotechnology under its Genome Editing Programme has led to the development of a novel bio-inspired lipid nanocarrier system for efficient intracellular delivery of CRISPR-Cas9-based genome editing tools. The lipid nanocarrier system was found to show significantly higher efficiency in delivering large therapeutic molecules including DNA, mRNA and proteins as compared to the other commercially available reagents. The development of bio-inspired lipid nanocarrier delivery systems would open new vistas for devising novel gene therapy-based therapeutic solutions for various rare and genetic diseases.

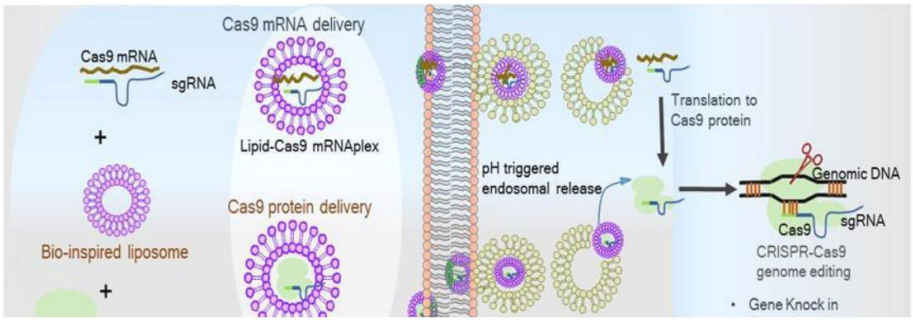


Fig: Schematic representation showing the mechanism of intracellular delivery of CRISPR-Cas9-based tools to a target cell using bio-inspired lipid nanocarrier system

An Indian patent application entitled: “Compact liposomal vehicle for delivery of large molecules” (Application No: 2202041010160) has been filed for this technology

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01S_31July2020.pdf

Genetically encoded live cell sensor for tyrosinated microtubules

Dr. Minhaj Sirajuddin's laboratory at the cytoskeleton lab in the cardiovascular biology and disease theme at DBT's Institute for Stem Cell Science & Regenerative Medicine (inStem), Bengaluru have developed and validated a live cell sensor against tyrosinated form of microtubules a unique microtubule PTM. The tyrosination sensor reported in this study is the first tubulin nano-body or sensor that can be used to study microtubules PTMs in live cells.

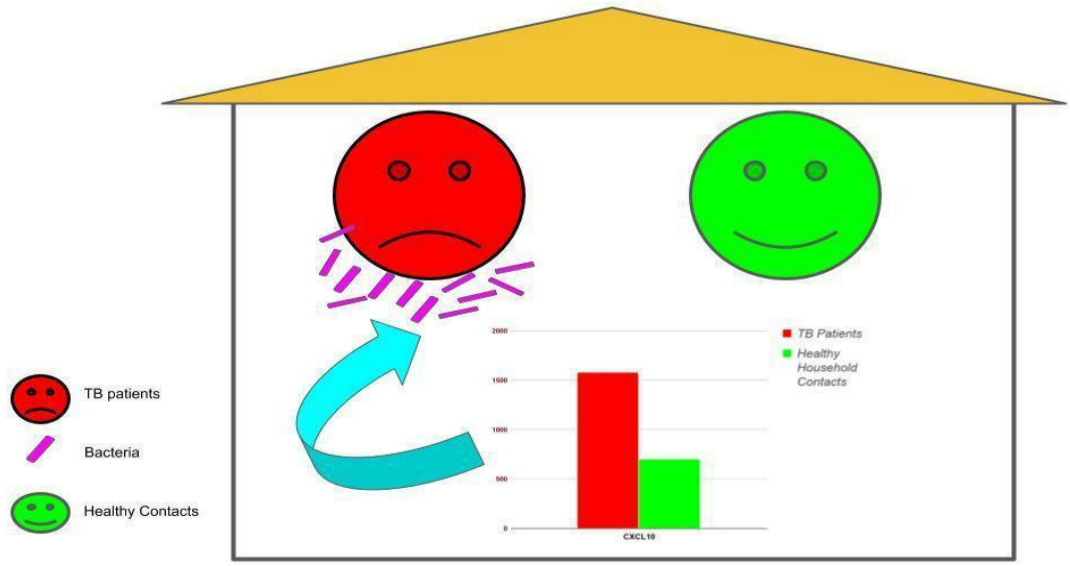
Their research work has also shown the application of this sensor in studying small-molecule (anti-cancer drugs) compounds that target microtubule. Thus, this sensors will facilitate studying microtubule functions for many researchers and will aid identifying new drugs of therapeutic value in future. Further, provisional patenting application has been filed for the commercial use of tyrosination specific sensor; jointly by inStem, Bangalore, India and North Carolina State University, Rayleigh, USA.

Microtubules are cytoskeleton polymers made of alpha/beta tubulin subunits that perform variety of cellular functions such as chromosome segregation, intracellular cargo transport, maintaining cell shape and organization. Many of these microtubule functions are regulated by post-translation modifications (PTMs) that occur in the tubulin subunits. A key limitation in understanding microtubule PTMs in these processes is the lack of tools to study their spatial-temporal organization.

Link: https://www.biorxiv.org/content/10.1101/2020.03.29.013250v1
Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_02B_4Aug2020.pdf

DBT-NIBGM researchers identify a potential biomarker for TB

Though an ancient disease, Tuberculosis (TB) is still among the top ten causes of death. In 2019 alone, the nationwide death toll due to TB was 0.4 million and 2.69 million people were infected. Upon exposure to the causal pathogen Mycobacterium tuberculosis, some people develop active disease with clinical symptoms like fever, weight loss, and coughing up of blood, requiring treatment, while many other individuals do not develop active disease in spite of harboring the pathogen. Many people can clear off the infection spontaneously. Investigation on critical host factors that act as weapons against the Mycobacterium is the main theme of a study conducted by the Department of Biotechnology's National Institute of Biomedical Genomics (DBT-NIBGM).



Variable clinical outcome is essentially a result of various human and bacterial factors, playing together. To underpin the plausible host factors, a team of researchers at the Institute designed a study with a bunch of TB patients and their healthy household contacts, preferably spouses. The healthy contacts did not develop any diseases in spite of sharing the same environment even for a long period of time.

They hypothesized that cytokines/chemokines, a type of secretory proteins from immune cells, are one of the first lines of defense against the invading bacteria. Consequently, the levels of these cytokines/chemokines would be altered among TB patients compared to their asymptomatic household contacts.

To accomplish their aim, the researchers enrolled the clinically and microbiologically confirmed TB patients on the very first day of their visit to the clinic before treatment starts. Next, they enrolled their spouses, if they remained disease free for at least next ninety days. They performed a comparative study on twenty two cytokines, relevant in mycobacterium infection, from plasma samples of enrolled TB patients and their household contacts. After doing all the statistical analysis, they found that one chemokine named CXCL10 was significantly high among the TB patients. Interestingly, the level of CXCL10 protein also showed a positive trend with the severity of the disease.

Next, they checked whether this altered expression of CXCL10 protein was due to the underlying variations in the CXCL10 gene of the individuals, instead of being due to the TB infection. To further strengthen their finding, CXCL10 protein was higher in TB patients irrespective of their sequence variation at CXCL10 gene, compared to healthy individuals. Active phase TB antigens were able to stimulate CXCL10 in-vitro, but not others.

The finding of the researchers raises a possibility of considering this protein as a marker for active phase of infection. However, further community-based large scale studies are warranted to evaluate its potential as a candidate biomarker of tuberculosis infection.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01S_5Aug2020.pdf

Effect of N-terminal poly histidine tag on immunogenicity of *Streptococcus pneumoniae* surface protein SP0845

At DBT**'s** National Institute of Immunology (NII), New Delhi, SP0845, a pneumococcal surface protein and a potential candidate vaccine for *Streptococcus pneumoniae* infection, was used to evaluate the role of hexa-histidine affinity tag on its biophysical properties and immunogenicity. The protein was expressed in *E. coli* with and without histidine affinity tag and purified to homogeneity. Size exclusion chromatographic studies revealed that tag free SP0845 was mainly monomeric in solution whereas, histidine tagged SP0845 stayed predominantly in an oligomeric form. Histidine-tagged SP0845 have higher β sheet content than the tag free protein. Removal of histidine tag increased the α-helical content of SP0845 from 35% to 46%. Histidine tagged SP0845 elicited higher serum antibody titer in comparison to the tag free SP0845 in mice.

Effect of alum in improving the immunogenicity of tagged SP0845 was low in comparison to that observed with tag free protein. Polymeric nanoparticles are biodegradable, biocompatible and FDA approved for human use. These polymer particles provide adjuvant activity and thereby improve the immunogenicity of the antigen. Thus, use of PLA particle based delivery system will be an ideal strategy to improve the immunogenicity of tag free recombinant protein. Immunogenicity of tag free SP0845 was enhanced by delivering it using polylactide polymeric particles. Immunization using PLA particles elicited sustained antibody titers from a single dose immunization.

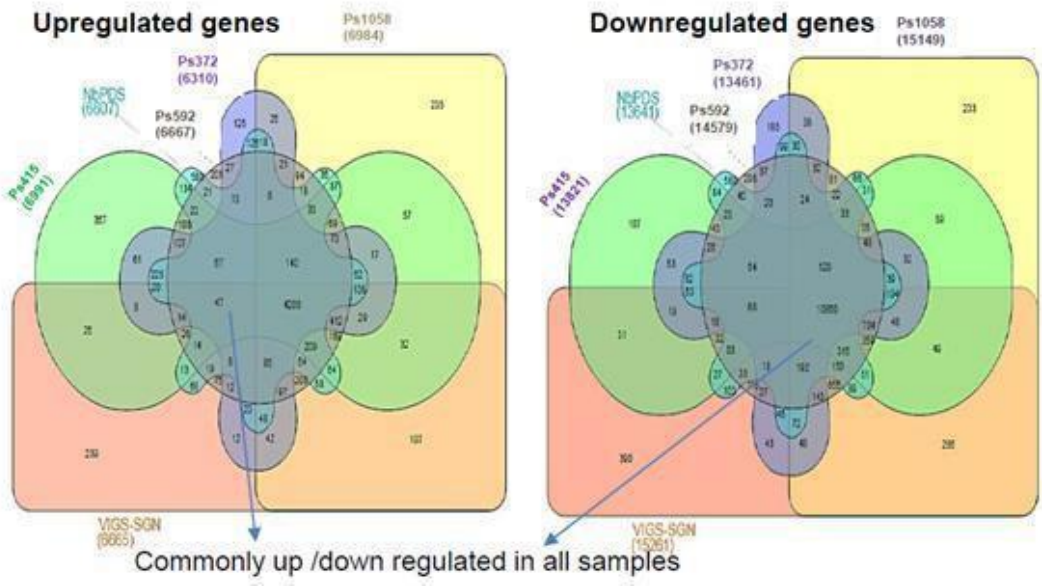
The present study highlights the detrimental effects of histidine tag for ease of purification. N-terminal histidine tag induced changes in oligomeric status of SP0845 which subsequently affected its immunogenicity. The presence of histidine tag thus influences the secondary structure and immunogenicity of protein and need careful consideration before use. Polymeric particles can be used to improve the immunogenicity of poorly immunogenic protein such as that devoid of any tag.

Link:https://www.researchgate.net/publication/342884587_Effect_of_N-terminal_poly_histidine-tag_on_immunogenicity_of_Streptococcus_pneumoniae_surface_protein_SP0845

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_02B_5Aug2020.pdf

pssRNAit: A web server for designing effective and specific plant siRNAs with genome-wide off-target assessment

At DBT-Regional Centre for Biotechnology (RCB), Faridabad designed an advanced web server named pssRNAit (plant specific small non-coding RNAi tool) that can be used to design functional small interfering RNAs for precise gene silencing in plants and provides a path to study gene functions and phenotypes in plants effectively. In developing this tool, the transcript dataset of plants, several rules governing gene silencing, and a series of computational models of the biological mechanism of the RNA interference (RNAi) pathway were integrated. The designed pool of siRNAs can be used to construct a long double-stranded RNA (long-dsRNA) and expressed through virus-induced gene silencing (VIGS) or synthetic trans-acting siRNA (syn59 tasiRNA) vectors for gene silencing.

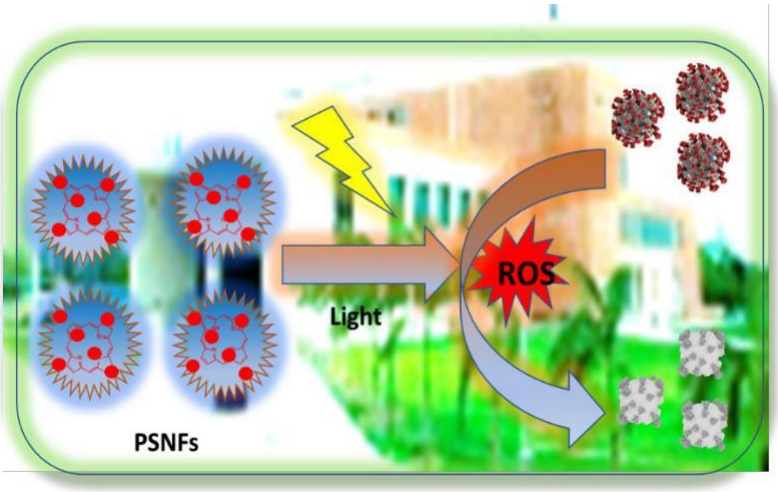


Dr. Ramu S. Vemanna, Assistant Professor of RCB, Faridabad co-authored a research article with other collaborators on “pssRNAit-a web server for designing effective and specific plant siRNAs with genome-wide off-target assessment”.

Link: http://www.plantphysiol.org/content/plantphysiol/early/2020/07/10/pp.20.00293.full.pdf
Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_03B_5Aug2020.pdf

COVID-19 research preparedness initiatives at DBT-CIAB: Exploring potential of photosensitizer nanoformulations for antiviral photodynamic therapy to treat COVID-19

In order to address the ongoing pandemic, scientists at DBT's Center of Innovative and Applied Bioprocessing has taken multiple research initiatives and are engaged tirelessly to develop low cost, scalable and light activatable nanomaterials in very short time-span. Photodynamic therapy (PDT) is an FDA approved technique to treat many deadly diseases including microbial infection and cancer. The basic requirement for PDT is light, oxygen and a photosensitizer (a light activatable fluorophore).



Antiviral PDT (aVPDT) is a branch of PDT which follows the same principles besides targeting viruses. Among photosensitizers, polypyrroles (e.g. porphyrins, chlorins - these are members of natural pigments heme and chlorophyll family) are commonly used which strongly absorb visible light to generate reactive oxygen species (ROS). ROS can directly damage virus targets through reacting with viral nucleic acids, lipids and proteins. Since these molecules lack aqueous solubility, preparation of their nanoformulations will improve hydrophilicity and targetability.

In this line, a group of researchers at DBT-CIAB headed by lead investigator Dr. Jayeeta Bhaumik to fabricate a series of photosensitizer nanoformulations (PSNFs) in simple and scalable manner. Recently, the team has completed the synthesis and chemical characterization of the PSNFs. The materials were further examined for their photophysical properties (e.g. ROS generation capacity) showing promising potential in many of them. Further, those nanomaterials were validated for their efficacy towards antimicrobial activity against *E. coli* in

the presence of low cost LEDs. The screened PSNFs with promising photophysical properties and antimicrobial activities are now ready to be sent to DBT-Regional Centre for Biotechnology BSL3 facility for testing against SARS-CoV2 cell lines.The research team has worked tirelessly during the lockdown period to prepare a series of light-activatable nanomaterials. The research team is hopeful for the library prepared by them will find a way to treat COVID-19 one day if succeeded in *in vitro* studies.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01B_3Aug2020.pdf

DBT-THSTI develops bioresources to help study COVID-19 pandemic

The Department of Biotechnology's Faridabad-based Translational Health Science and Technology Institute (DBT-THSTI) has established a set of patient cohorts as a part of the National Bioresource Centre for COVID-19, which is an initiative of DBT, its autonomous institutions, and hospitals in Delhi and other parts of the National Capital Region.

The Biorepository facility at THSTI has developed the following COVID-19 Bioresources:

- Standardized well phenotyped serum panel for testing of antibodies (development and evaluation sera panels)
- Pooled samples to develop calibrators/controls (both positive and negative for SARSCoV2 for diagnostic assays)
- Standardized nasopharyngeal/oropharyngeal panels for testing of antibodies and
- Viral strains, and inactivated virus

Over 4,000 samples have been collected from participants who were suspected of SARS-CoV2 infection, irrespective of whether they tested positive or negative. Almost 2,000 people who have tested positive are being followed up with about 250 people having given samples 6-10 weeks after being diagnosed.

The THSTI's Biorepository has received 20 requests from academia and industry. It has responded to 12 requests and others are being processed through an external access control

committee, established by DBT, that independently decides the merit of each application. The requests include those for COVID-19 positive sera and plasma, COVID-19 negative samples, and sera and nasopharyngeal/oropharyngeal swabs in viral transport medium.

In response to the requests, the Biorepository has provided a total of about 2400 sera samples and 130 naso- and oro-pharyngeal swabs to date. Eight development sera panels (including samples from 100 participants), two naso-oro-pharyngeal panels (75 samples), four evaluation panels (samples from 100 participants), pooled positive standard and pooled negative standard have been shared.

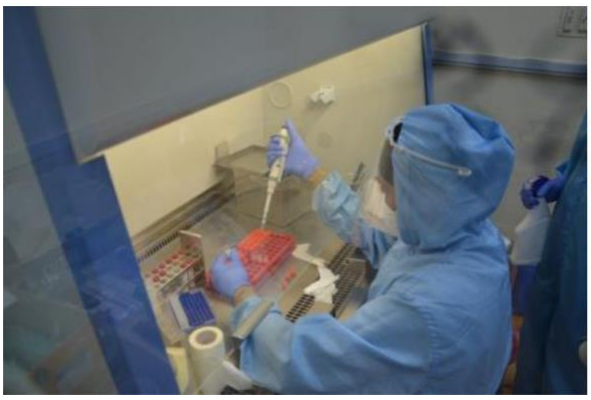
In addition, DBT-THSTI offers diagnostic performance evaluations, and most recently has evaluated ELISafe 19 IgG ELISA for SARS-CoV-2 developed by Syngene International Ltd/Himedia for 3 manufacturing batches by a 'beta-testing panel' and a Q-Line IgG Rapid card for SARS-CoV-2 developed by POCT Services Pvt. Ltd. and RGCB by a 'development panel.'

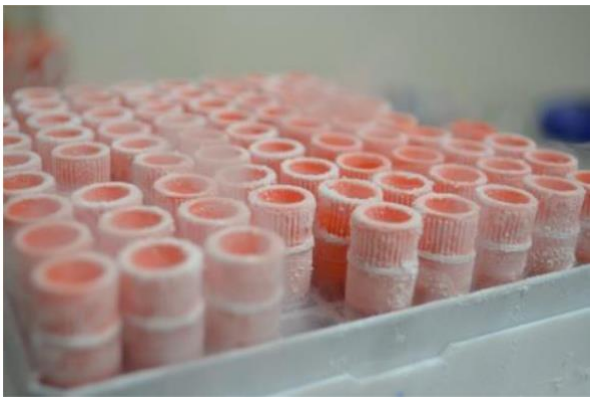
Various SOPs related to the THSTI Biorepository bioresource on COVID-19 are available at https://thsti.res.in/covid_bioresources.php

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01S_3Aug2020.pdf

NCCS biobank is recognized by ICMR as a designated biorepository for COVID-19

To contribute to the ongoing national efforts against COVID-19, DBT's National Centre for Cell Science (NCCS), Pune has established a biorepository in association with the B. J. Medical College and the Armed Forces Medical College. This bio-bank collects and stores components of blood called peripheral blood mononuclear cells (PBMCs) and plasma, from clinical samples. Established with due approvals from the appropriate authorities, this biobank began operations in May, 2020 and has stored eighty-three samples so far.





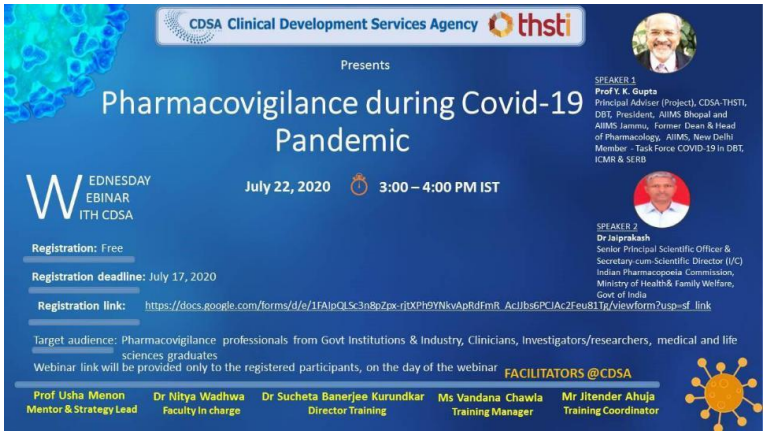
It functions in compliance with the guidelines and requirements of the Indian Council of Medical Research (ICMR), which includes obtaining informed consent from the patients or their family members prior to sample collection, and following the standard operating procedures formulated for this purpose. This biobank has been recognized by the ICMR as a designated biorepository.

The NCCS Pune is one of the five institutes of the DBT to have received this recognition. A network of seventeen such biorepositories 1 across India was established by the ICMR to provide a structured mechanism to collect and store clinical samples from COVID patients in the country. Research using samples from these biorepositories would help better understand the disease in the Indian scenario. The document, 'Establishment of a network of biorepositories in India', which is available on the ICMR website (https://www.icmr.gov.in/cbiorn.html), provides details about this initiative undertaken for the benefit of the nation.

With the number of COVID-19 cases continuing to rise and the current pandemic showing little signs of letting up, it may continue to be a major concern for months to come. Early diagnosis and treatment are of paramount importance in the war against this disease. Research and development are also critical for public health benefits in the short and long term. Biobanks play a key role in supporting and facilitating these activities. These biological repositories collect and store different kinds of well characterized clinical samples from patients. Such samples are crucial tools for research, which provides vital insights into the biology of the virus and the body's responses to it. They, thus, serve as a precious biological resource to develop and validate diagnostics, therapeutics and vaccines, and to design better mitigation strategies. Biorepositories are therefore a boon for public health management, especially in situations like the current pandemic.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_02B_3Aug2020.pdf

Fifth Wednesday Webinar with CDSA titled "Pharmacovigilance during COVID-19 Pandemic" conducted



The CDSA-THSTI's fifth webinar in the series Wednesday Webinar with clinical development service agency (CDSA) was titled *"Pharmacovigilance during COVID-19 Pandemic"*. The first speaker Dr. Y. K. Gupta, Principal Adviser (Projects) at CDSA-THSTI spoke about the problems and safety issues of drugs being used for the first time, repurposed drugs, and vaccines. The second speaker represented the Indian Pharmacopoeia Commission that has 311 ADE monitoring centres across the country**.** Dr. Jai Prakash, Adviser at IPC gave a brief overview of the functions of the pharmacovigilance mission of India and steps taken by the Commission during the COVID-19 pandemic. The webinar was moderated by Aditya Kaushik and Vandana Chawla.

"Dexathasone, Remdesivir, Itolizumab – when we have all these drugs, why not use them to treat all those who are sick?" asked my cousin who, like most of you is flooded with news on the progress science is making towards finding a drug for COVID-19. As much as we wait with bated breath for that saviour drug to act against COVID-19, what scientists are also worried about are what they call *Adverse Drug Events (ADEs)*. After a drug is designed and before is shown to be safe for use and effective against a disease, it goes through a long process. No, scientists who develop the drugs don't do it themselves. A third organization undertakes activities to detect, assess, understand and thence prevent any adverse effect caused by a drug. For India, this is done by the Indian Pharmacopoeia Commission and what they do is called PHARMACOVIGILANCE.

Link: https://www.youtube.com/watch?v=uZYQ_ObeJn8&feature=youtube
Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_03B_3Aug2020.pdf

DBT-inStem holds outreach webinar on 'Immunology of COVID-19'

The Department of Biotechnology's Institute for Stem Cell Science & Regenerative Medicine (DBT-inStem) is one of the founding partners of COVID-Gyan, a pan-institutional website that has been proactive in COVID-19 outreach efforts. It has, among other things, been holding webinars on various aspects of the pandemic.

The sixth session of the COVID-Gyan's WebGyan series featured a talk by Dr. Shahid Jameel, an eminent virologist and the CEO of the Wellcome Trust DBT India Alliance. The topic of the session held on July 23 was 'Immunology of COVID-19' and focused on the immune response to SARS-CoV-2, how it links to protection from disease, exacerbation of disease, and the implications for therapy and future COVID-19 vaccines.

Dr. Jameel began the session by sharing a video, titled 'COVID-19 Immunology 101 for Non-immunologists' prepared by Dr. Akiko Iwasaki of Yale University, USA followed by citing the numbers of the pandemic as they stand today globally and then focusing on Indian states. He also highlighted differences in progression with examples of urban hubs such as Delhi, Mumbai and Bengaluru; structure of the viral genome; nature of infection and disease transmission, types of possible vaccines (DNA, RNA, viral vector etc). and the current status of SARS-CoV-2 vaccines. He noted that the coronavirus family carries proof-reading activity, so the virus strains don't change as fast as other RNA viruses.

He applauded the dedication and relentless work of the scientific fraternity towards the R&D effort in fighting COVID-19 and emphasized that vaccines, once released will be used based on need and severity especially for frontline workers like medical practitioners, followed by

senior citizens and co-morbid groups and so on. He reiterated the need to practise personal safety by wearing facemasks and avoiding public/crowded spaces. He concluded his talk by stating that more pandemics will affect the human race due to mindless human interference with nature in the form of deforestation, wildlife trade, and global warming and stressed the need to promote a sustainable, healthy, and eco-friendly lifestyle.

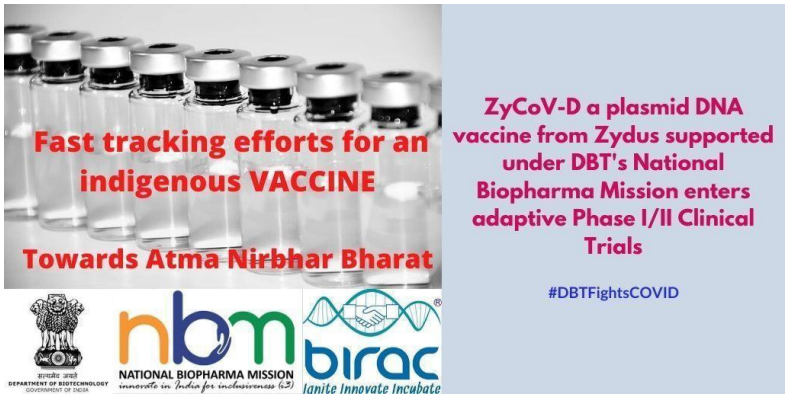
The 100 minutes session was moderated by Prof. Rajesh Gopakumar, ICTS- TIFR, Bangalore and Sandhya Koushika, TIFR-Mumbai. It was live streamed on COVID-Gyan YouTube channel. The session attracted more than 100 registrations and nearly 300 online viewers and was recorded on July 23, 2020. It can be watched here.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_03S_3Aug2020.pdf

DBT supported COVID 19 vaccine begins adaptive phase I/II clinical trials

Phase I/ II clinical trials on a plasmid DNA vaccine designed and developed by Zydus and supported under Department of Biotechnology's National Biopharma Mission has been recently initiated in healthy subjects, making it the first indigenously developed vaccine for COVID-19 to be administered in humans in India.

The multi-centric adaptive Phase I/II dose escalation study will assess the safety, tolerability and immunogenicity of the vaccine. The human dosing of the vaccine marks a key milestone since the launching of the accelerated vaccine development programme for COVID-19 in February 2020.



Named `ZyCoV-D', the vaccine was found to elicit a strong immune response in the pre-clinical phase in multiple animal species like mice, rats, guinea pigs and rabbits. The antibodies produced were able to neutralize the wild type virus in virus neutralization assay indicating its protective potential. No safety concerns were observed in repeat dose toxicology studies by both intramuscular and intradermal routes of administration. In rabbits, up to three times the intended human dose was found to be safe, well tolerated and immunogenic.

With ZyCoV-D, the DNA vaccine platform has been successfully established in the country using non- replicating and non-integrating plasmid carrying the gene of interest making it very safe. Further, with no vector response and with absence of any infectious agent, it provides ease of manufacturing with minimal biosafety requirements (BSL-1).

The platform is also known to show much improved vaccine stability and lower cold chain requirements making it easy for transportation to remote regions of the country.Furthermore, it can be rapidly used to modify the vaccine in a couple of weeks in case the virus mutates to ensure that the vaccine still elicits protection.

Link: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_02S_3Aug2020.pdf