Department of Science & Technology
(Government of Gujarat)

GBRC NEWS

Volume I, Issue II
June 2021

CONTRIBUTION OF GBRC IN COMBATING COVID-19 PANDEMIC

As the premier biotechnology institute, GBRC has taken the initiative towards fighting the pandemic. The institute started working on different aspects of COVID-19. Genome sequencing of COVID-19 causing virus i.e. SARS-CoV-2 is one of the major research conducted at the GBRC. Till date, GBRC has completed sequencing of hundreds of SARS-CoV-2 genomes which is openly available (http://covid.gbrc.org.in/). The data thus generated can be used to know modes of infection and its differential effects on the host, to study mutational landscape of the virus, as well as can be used to develop medical interventions. GBRC has conducted Genome Wide Association Study (GWAS) in COVID-19 patients of varying category of disease severity i.e. asymptomatic, symptomatic and deceased. Genetic markers have been identified which can be used for prognosis and risk predication of the disease in human populations. RT-PCR method have been developed to detect the RNA of virus in the untreated waste water collected from various locations in Gujarat, India. First time in India, GBRC along with IIT, Gandhinagar, have conducted waste water based epidemiology study. These studies are helpful in pandemic prediction in order to make early efforts for controlling. Further, with the help of molecular docking and dynamics therapeutic potential of herbal formulation and various plant compounds have been identified.

COVID TASK FORCE MEETING UNDER CHAIRMANSHIP OF SHRI VIJAY RUPANI, CM, GUJARAT

Government of Gujarat with the support of GBRC has decided the action plan against the possible third wave of COVID-19. A meeting, chaired by chief minister of Gujarat Shree Vijay Rupani, was held to address the issue. The meeting was attended by medical experts, GBRC scientists, ministers and senior government officials. GBRC scientists have given the important research insights on genome sequencing of the COVID-19 in front of core committee.

COVID-19 DIAGNOSIS

GBRC is working as ICMR recognized COVID-19 diagnosis centre. GBRC has managed to diagnose more than ten thousand patient's samples. Thus, GBRC has made great efforts and has shown its calibre in fighting the pandemic.

PRESS NOTE- GBRC ALONG WITH HESTER BIOSCIENCE LTD. AND OMNIBRX TECHNOLOGIES ENTERED INTO MoU WITH BHARAT BIOTECH Ltd. On 27th May 2021

Gujarat to start production of drug substance for COVAXIN manufacturing under the leadership of Hon'ble Chief Minister Shri Vijaybhai Rupani. GBRC along with Hester Bioscience Ltd. and Omni BRx Technologies has entered into MoU with Bharat Biotech Ltd. for the same. In the current situation it is required to accelerate the production of vaccine which can be made available to the people of Gujarat and India. With the foresights of Government of Gujarat last year, GBRC had signed MoU with three companies, namely Hester Biosciences Pvt. Ltd., Supratech Laboratory and Vekaria Healthcare LLP to develop a COVID-19 vaccine and diagnostics. This is possible by expanding the production of current vaccine through contract manufacturing. The vaccine manufacturing process is highly complex and requires Biosafety Level 3-biocontainment facilities. If everything goes according to plan, the bulk production of this drug substance equivalent to 20 Million doses per month will begin from August, 2021. This will be then supplied back to Bharat Biotech Ltd. for producing vaccine doses. This entire process is facilitated by Department of Biotechnology, Government of India. The primary role of GBRC is as advisor, mentor and facilitator for enabling collaborations between BBIL and Hester Biosciences Ltd. HBL will build the BSL 3 facility and obtain of regulatory approvals while OmiBRx will give technology support. This will be supplied back to Bharat Biotech Ltd. for production of finished doses.

CONTENTS

MEDIA COVERAGE

GBRC provided key research insights during pandemic

During this second wave, which has been deadlier than the first one, one of the important research tasks was to recognize variants across the country. As the backlog of sequencing samples increased at the National Institute of Virology, the health department of Gujarat started utilizing the GBRC facility for recognizing SARS-CoV-2 variants across the state. Along with that, the study that GBRC collaborated with IIT Gandhinagar for getting indication of the pandemic spread and trend from wastewater has found that Ahmedabad which had the highest number of Covid-19 cases, has the second largest RNA copies per 1 lakh litre of wastewater while Vadodara had the highest concentration of the same.

"The Indian Express" article on "28th May 2021" on MoU of GBRC with Bharat Biotech to produce drug substance for Covaxin

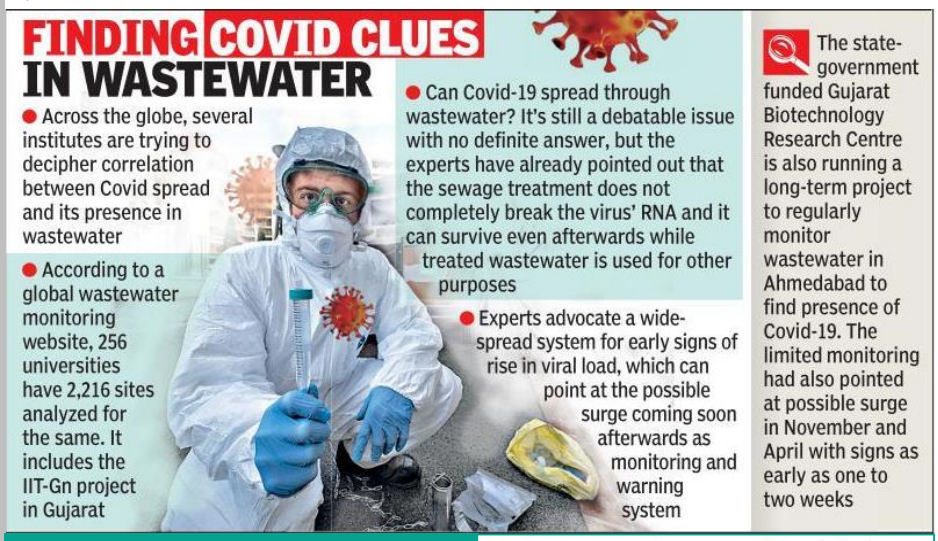
Gujarat: GBRC signs MoU with Bharat Biotech, firm to produce drug substance for Covaxin

GBRC and Gujarat government will act as "mentor, advisor and facilitator for the technology transfer" from Bharat Biotech, the statement said.

"The Times of India" article on 23rd May 2021" on collaboration of GBRC with IIT-Gn for corona outbreak signs in wastewater

Researchers read corona outbreak signs in wastewater

May 23, 2021, 04.52 AM IST



17th May 2021 "Times of India"

As an unprecedented second wave of pandemic rages across the country, GBRC continues to contribute as a research centre in the fight against covid-19.

"The Indian Express" article on "14th March 2021" about "Covid genomes sequencing at GBRC"

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Gujarat Biotechnology Research Center contributes to Covid genomes sequencing

GBRC in Gandhinagar was the second laboratory in India after National Institute of Virology (NIV) in Pune, to complete the sequencing of a whole genome of the novel coronavirus in April 17, 2020 from a single sample of a Covid-19 positive patient.

2nd March 2021

Times of India titled 'Genetic factors in Gujarat behind high morbidity' According to GBRC, the genetic make-up of Gujarat itself is responsible for the higher mortality and morbidity in rate in Gujarat and not the new variant of COVID-19, and THE LANCET published pre-print.

Three genes were included in this study for analysis- N, ORF1ab and S. N gene was present more in Ahmedabad, S and ORF was highest in Vadodara. Another study which was performed *in silico* in GBRC revealed that yashtimadhu (liquorice) and harde (haritaki) has the highest bonding score with Covid-19 along with few antivirals currently in use for treatment. Officials from GBRC attended a task force meeting on preparations for the next Covid-19 meeting chaired by the chief minister of state, Shri Vijay Rupani. Also, the state Government has allocated funds to GBRC for BSL 3 laboratory. GBRC has been providing important insights during this pandemic by utilizing it's facility of genome sequencing.

MEMORANDUM OF UNDERSTANDING (MoU)

MoU between GBRC and NIF

GBRC entered into MoU with NIF (National Innovation Foundation) on 17th March 2021 by the director of GBRC (Prof. Chaitanya G Joshi) and the director and chief innovation officer of NIF (Dr. Vipin Kumar). NIF is an autonomous body of Department of Science and Technology, Government of India having its office at Amrapur, Gandhinagar. The institute mainly focuses on incubating and promoting grassroots technological innovations and outstanding traditional knowledge practices. As a result of this MoU, GBRC will help in validation and value addition of herbal leads as shared by NIF including preclinical validation, extraction, purification, DNA fingerprinting/ barcoding, transcriptomics / Next Generation Sequencing, formulation development and other related research at GBRC.

VACCINATION DRIVE

GBRC organized COVISHIELD vaccination for their employees on 16th and 17th March. Hence GBRC has proven to be socially responsible for their employees' wellbeing.

ARRIVAL & DEPARTURE

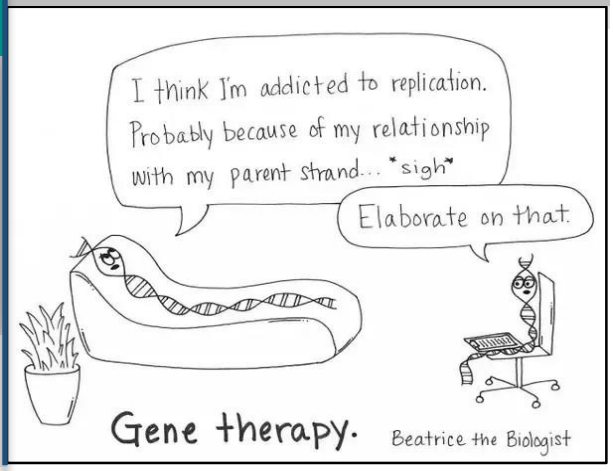
GBRC would like to extend a hearty welcome of new members to the family

- Budhbhatti Urvi Harishchandra
- Dr. Deepali Chauhan
- Dr. Indra Singh
- Dr. Prashant More
- Ezhuthachan Mithu Mohanan
- Shruti Darshan Sharma
- Gadkari Chinmay Prasad
- Shilpa Doultani
- Purva Gohil
- Roshni Kumari Mishra
- Nitin Birendra Shukla
- Reshma Talkal

GBRC wishes best for the future of the bright minds who had left

- Afzal Ansari: ICMR NIRTH
- Akshay Joshi: Lambda Therapeutic Research Ltd.
- Avani Desai: Pathocare pathology laboratory
- Chinmayi Joshi: Sankalchand Patel University
- Dr. Apurvasinh Puvar: Sterling accuris diagnostics
- Dr. Manan Patel: Sterling accuris diagnostics
- Dr. Pritiraj Pandit: IIT Mandi
- Het Bharvad: For higher studies
- Khushbu Rabadiya: Gujarat University
- Kishan Purohit: Pathocare pathology laboratory
- Mital Nakrani: Cadila Pharmaceutcals
- Nikha Trivedi: NIPER Ahmedabad

ON LIGHTER NOTE



PRABODH

GBRC has initiated "PRABODH" (**P**romoting **R**esearch **A**wareness in **B**iotechnology for **D**evelopment of **H**uman Resource) to accelerate the research work and to develop research-oriented thought process in staff.

INVITED GUEST

Prof. Rama Ratnam (20/02/2021) *Neuroscientist, Professor at School of arts and sciences at Ahmedabad University, Ahmedabad*

He has Bachelor degree from IIT, Delhi and MS in Biotechnology from University of Texas at San Antonio, also earned Ph.D. from University of Illinois at Urbana Champaign in BioPhysics. He has served as biology faculty at the University of Texas at San Antonio, Senior Scientist at University of Illinois and then he joined Ahmedabad University as Professor in 2019. His area of interest is coding in neurons, ranging from neuroscience to neural engineering. He is mainly an *In vivo* Neuronal Physiologist. He talked about how our brain uses 20% of total energy in our body and from that 60% is used only in spiking/action potential. He also mentioned different types of coding-temporal and rate neuronal coding. He also talked about developing such type of hearing aid which can help people with hearing difficulty, to listen with comparatively better sound quality.

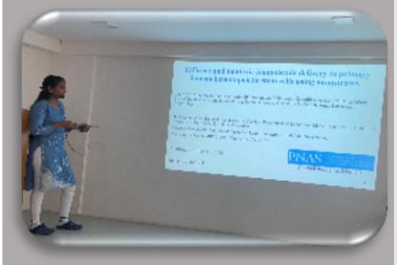
Mr. Chandresh Chhatbar (20/03/2021) *Head, Formulations R&D, CMC & M.Tech Bacterial and Viral Vaccines, Sanofi Healthcare India, Hyderabad*

Mr. Chandresh Chhatbar has more than 20 years of experience in the field of pharmaceuticals and biopharmaceuticals product development including drug delivery devices technologies. He has rich experience in biosimilar, vaccines, chemically synthesized peptides and oncological formulation development. He has worked with patented molecules and developed several non-infringing formulations and successfully launched them in market. With deep understanding of the regulatory landscape and current trend in the pharmaceuticals and biopharmaceuticals he is leading formulation platform at Sanofi healthcare India for both bacterial and viral vaccines and for WHO and UNICEF supply. His lecture mainly focused on working of pharmaceutical company, difference between generic and biosimilar, understanding of GLP and its requirements in laboratory.

PRESENTATION FROM GBRC RESEARCH FELLOWS

Sadik Dantroliya

Article: A Novel Recirculating Aquaculture System for Sustainable Aquaculture: Enabling Wastewater Reuse and Conversion of Waste- to-Immune-Stimulating Fish Feed
Journal: ACS Sustainable Chemistry & Engineering;
Impact factor: 7.632



Zarna Patel

Article: Efficient and nontoxic biomolecule delivery to primary human hematopoietic stem cells using nanostraws
Journal: Proceedings of the National Academy of Sciences;
Impact factor: 9.412

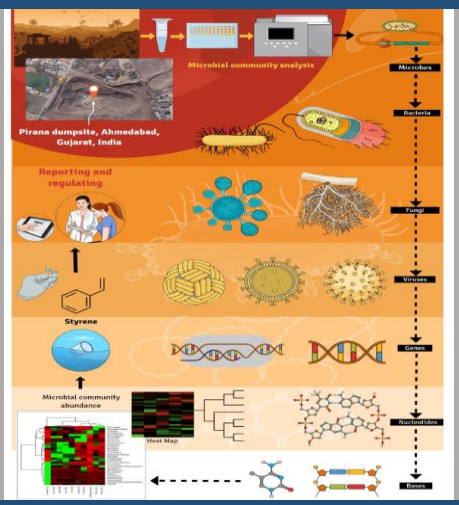
PRESENTATION FROM GBRC MEMBER

Dr. Amrutlal Patel (Joint-Director) (20/03/2021)
Article: *Versatile and multivalent nanobodies efficiently neutralize SARS-CoV-2.* ***Journal:*** *Science;* ***Impact factor:*** *41.845*

The detailed presentation was given on development of bioengineered multivalent neutralizing nanobodies (Nb) constructs (from Camelid) that achieved ultrahigh neutralization potency (half-maximal inhibitory concentration as low as 0.058 ng/ml) and may prevent mutational escape. With the help of sequencing and proteomics large quantities of Nbs were standardized. Nb20 and Nb21 were found to have high efficacy towards severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epitopes.

RECENT PUBLICATIONS

LANDFILL MICROBIOME HARBOUR PLASTIC DEGRADING GENES: A METAGENOMIC STUDY OF SOLID WASTE DUMPING SITE OF GUJARAT, INDIA



Authors: Raghawendra Kumar, Priti Pandit, Dinesh Kumar, Zarna Patel, Labdhi Pandya, Manish Kumar, Chaitanya Joshi, Madhvi Joshi

Journal: Science of The Total Environment (Impact factor: 6.551)

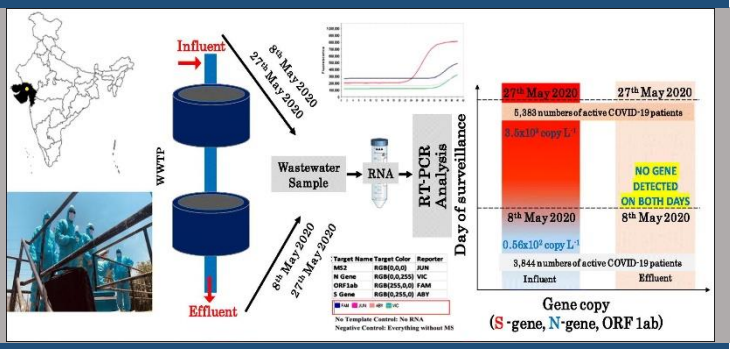
Environmental pollution by plastic waste has become a severe ecological and social problem worldwide. The study was conducted to analyse the bacterial community structure and functional potential of the landfill site using a high throughput shotgun metagenomic approach to understand plastic degrading capabilities present in the municipal solid waste (MSW) dumping site. The functional profiling revealed the presence of enzymatic groups and pathways involved in biodegradation of xenobiotics. The results also demonstrated the presence of potential genes that are associated with the biodegradation of different types of plastics.

FIRST PROOF OF THE CAPABILITY OF WASTEWATER SURVEILLANCE FOR COVID-19 IN INDIA THROUGH DETECTION OF GENETIC MATERIAL OF SARS-COV-2

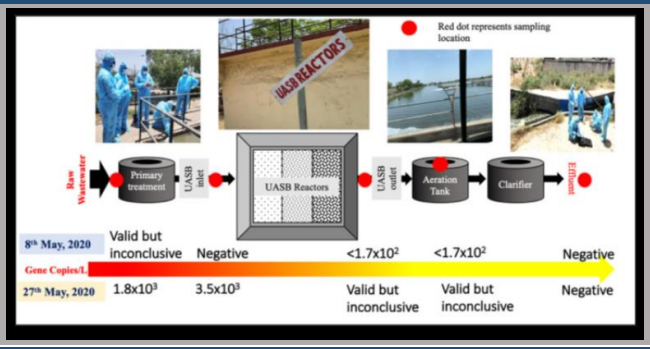
Authors: Manish Kumar, Arbind Kumar Patel, Anil V. Shah, Janvi Raval, Neha Rajpara, Madhvi Joshi, and Chaitanya G. Joshi.

Journal: Science of The Total Environment (Impact factor: 6.551)

This is the first ever successful effort in India to detect the genetic material of SARS-CoV-2 viruses by using wastewater-based epidemiology (WBE) surveillance. This proved very useful for pandemic surveillance.



DECAY OF SARS-COV-2 RNA ALONG THE WASTEWATER TREATMENT OUTFITTED WITH UPFLOW ANAEROBIC SLUDGE BLANKET (UASB) SYSTEM EVALUATED THROUGH TWO SAMPLE CONCENTRATION TECHNIQUES



Authors: Manish Kumar, Keisuke Kuroda, Arbind Kumar Patel, Nidhi Patel, Prosun Bhattacharya, Madhvi Joshi, and Chaitanya G. Joshi.

Journal: Science of The Total Environment (Impact factor: 6.551)

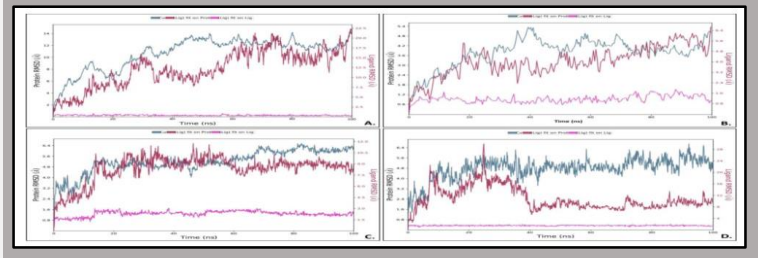
The study implies the positive effect of Upflow Anaerobic Sludge Blanket (UASB) treatment of waste water on removal of SARS-CoV-2 genetic loadings.

REPURPOSING OF THE HERBAL FORMULATIONS: MOLECULAR DOCKING AND MOLECULAR DYNAMICS SIMULATION STUDIES TO VALIDATE THE EFFICACY OF PHYTOCOMPOUNDS AGAINST SARS-COV-2 PROTEINS

Authors: Chinmayi Joshi, Armi Chaudhari, Chaitanya Joshi, Madhvi Joshi, Snehal Bagatharia

Journal: Journal of Biomolecular Structure & Dynamics (Impact factor: 2.689)

Herbal formulations were investigated for in silico effect against SARS-COV-2 proteins involved in various functions of a virus such as attachment, entry, replication, transcription, etc. The results showed that Liquiritic acid, Liquorice acid, Terchebulin, Glabrolide, Casuarinin, Corilagin, Chebulagic acid, Neochebulinic acid, Daturataturin A, and Taraxerol were effective against SARS-COV-2 proteins with higher binding affinities with different proteins.



SKILL DEVELOPMENT PROGRAMS

TRAINING ORGANIZED BY GBRC

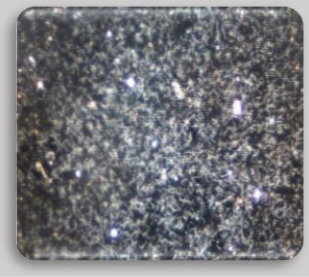
Free, online antimicrobial resistance training launched

Partners: Royal Veterinary College, Anand Agricultural University, Gujarat Biotechnology Research Centre

Published on 15/04/2021

Training on antimicrobial resistance was launched on 15th April 2021 by Royal University College (RVC), London, UK; Anand Agricultural University (AAU), Anand, Gujarat and Gujarat Biotechnology Research Centre (GBRC), Gandhinagar, Gujarat for free and was held on online platform. The training was focused on molecular techniques to monitor and investigate antimicrobial resistance (AMR). This is six-week online open course for anyone working on AMR around the world. Participants can attend the course from 24th May to 4th July or 14th June to 26th July. In addition to that, 10 days hands-on practical training will be given on necessary skills to the selected researchers from India, Sri Lanka and Bangladesh who have attended the online session. The director for the training was Dr. Subhash Jakhesara (AAU, India). The course team has Dr. Prakash B. Koringa from AAU, Dr. Madhvi Joshi from GBRC, Dr. Ben Swift, Prof. Ayona silva-Fletcher, Prof. Damer Blake and Prof. Fiona Tomley from Royal veterinary college, UK. The course mainly focuses on application of molecular biology techniques in studying human diseases. High-level training programs were involved in this course, which focuses on molecular diagnostics in monitoring and investigating AMR.

TEAM CAPACITY BUILDING



Training host: *The Tamil Nadu Veterinary and Animal Sciences University (TANUVAS)*
Training title: *Handling of Leptospira cultures*
Resource person:
Dr. KG Tirumurugaan(Professor and Head at Zoonosis Research Laboratory, TANUVAS, Chennai)
Dr. Senthil Kumar (Associate Professor and Head, Teaching Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu)

TANUVAS conducted training for handling Leptospira cultures by Dr. KG Tirumurugaan and Dr. Senthil Kumar, which included hands on teaching of DNA isolation from pure cultures of *Leptospira interrogans,* microbial agglutination test (MAT) for the *Leptospira interrogans*, microscopic examination (dark field) and ELISA for the detection of the antibody Ig G and Ig M in the serum of the infected rats. The training was attended by Dr. Satyamitra Shekh (Scientist-B) and Dr. Dalip Singh Rathore (Technical Assistant) from 16th to 18th February. Similar type of project is being carried out in GBRC entitled "Development of DNA based Diagnostic kit and Universal Vaccine candidate for Leptospirosis".

IN-HOUSE TRAINING ON NEW ADDED FACILITIES

DIGITAL POLYMERASE CHAIN REACTION (dPCR)

QIACuity Digital PCR was installed at GBRC.
It is the first installation of such state-of-art system in India by QIAGEN. This is nanoplate-based system seamlessly integrates a standard dPCR workflow of partitioning, thermocycling and imaging into a walk-away automated platform with minimal hands-on time.
Soon it will also be available in shared lab facility.

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

State-of-the-art preparative cum analytical HPLC system with photodiode-array detection (PDA) and evaporative light scattering detector (ELSD) has been installed at GBRC, for which basic training program was conducted on 6th May 2021 by application specialist Mr. Dinesh Gajera and service engineer Mr. Vipul Gohil (Spinco Biotech Ltd.).

SCHRODINGER TRAINING

It is software used for computational chemistry and drug discovery programs. It is computational program used to evaluate compounds *in silico*, with experimental accuracy on properties such as binding affinity and solubility. It is mainly used for molecular docking and modeling programs. The training was started on 1st March for one week. The lectures mainly involved protein and ligand preparation, molecular docking, binding site analysis, glide software extra precision (XP) docking, enrichment calculation by Vinod Devaraji senior scientist as well as molecular dynamics (MD) simulations, drug discovery on Desmond Maestro by Mr. Prajval.

IN-HOUSE INDUCTION TRAINING

GBRC conducted In-house training for the new joiners in the time period of 15-19th March 2021. The training included basic instrumentation, techniques and Good Laboratory Practices (GLP) in molecular biology, genomics, cell culture and proteomics and all the facilities in the GBRC. After the completion of training the examination of GLP was conducted which needs to be cleared by the fellows before working in laboratory.

EVENT CONDUCTED

OUTREACH EVENT ON GRANT WRITING AND FUNDING OPPORTUNITIES

GBRC along with GSBTM and Kamdhenu University has conducted a webinar on Grant writing and funding opportunities, as the part of the Outreach Program, by India Alliance. The program was specifically designed for Veterinary and Animal Science students and scientists. Different sessions were conducted on both the fundamentals as well as the more advanced aspects of grants writing. The event included the following topics: key elements of a grant application, the importance of a good research plan, common flaws in grant applications, how to make an impact on reviewers, research planning, data representation, communication tools. Moreover, sessions focusing on various funding programs of India Alliance for veterinary/animal science researchers in light of their remit, eligibility, provisions, requirements, and application forms was also proposed.

Contact Information
Gujarat Biotechnology Research Centre (GBRC)
Department of Science & Technology,
Government of Gujarat,
6th floor, M. S. Building, Sector 11,
Gandhinagar, Gujarat, 382011
India.
Email id: info-gbrc@gujarat.gov.in
Contact no.: +91-079- 23258500
Website: https://gbrc.gujarat.gov.in/ ; http://gbrc.res.in
For Shared Lab Facility : https://gbrc.org.in/

Editor in Chief:
Prof. C. G. Joshi
Director - GBRC

Executive Editors:
Dr. Madhvi Joshi
Joint-Director – GBRC

Dr. Amrutlal Patel
Joint-Director – GBRC

Editorial Team:
Nimesh Patel (Technical Assistant- GBRC)
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Deshna Shah (Junior Research Fellow- GBRC)

GUJARAT BIOTECHNOLOGY RESEARCH CENTRE

DEPARTMENT OF SCIENCE AND TECHNOLOGY
GOVERNMENT OF GUJARAT

Department of Science & Technology (Government of Gujarat)

ANNOUNCES

Shared LAB

ONLINE SYSTEM

Facilities under shared lab

- NGS Illumina MiSeq
- NGS Ion S5 Semiconductor Sequencer
- NGS Ion Proton
- NGS Ion Personal Genome Machine
- BD Flow Cytometer & Cell sorter
- Capillary ABI 3500 Sequencer
- Real time PCR machine
- PCR+ Gel Doc
- Nanodrop, Qubit
- Lyophilizer
- Digital PCR
- Preparative/Analytical HPLC
- GC-MS (Clarus 680 /Clarus SQ8C with column C18)
- HPC Server & Param Shavak Server for Bioinformatics (with CLC Genomics and MATLAB)

GBRC SHARED LAB ONLINE BOOKING SYSTEM: https://gbrc.gujarat.gov.in

GUJARAT BIOTECHNOLOGY RESEARCH CENTRE
Department of Science & Technology, Government of Gujarat
Block B and D, 6th Floor, M S Building, Gandhinagar 382011
https://gbrc.gujarat.gov.in