

# ADVANCED CENTRE FOR BIOSEPARATION TECHNOLOGY

## News Letter 2020



# Advanced Centre for BioSeparation Technology (CBST) News Letter 2020

The Advanced Centre for BioSeparation Technology (CBST) is dedicated to the field of separation sciences and molecular interactions. It has a unique combination of being innovative and highly intellectual with keen interest in translation. This has been built as a policy and scientific culture.

The Centre for BioSeparation Technology (CBST) was created under the “Intensification of Research in High Priority Areas” programme funded by the **Department of Sciences and Technology (DST)**, Government of India. **Prof. M.A. Vijayalakshmi**, having been identified for her expertise in the field of Purification Science and Technology was invited from France to set up the Centre in India with a host structure of her choice to help our country in developing this important area, much required for Industry-Academia in R&D. She chose VIT University, Vellore as the host structure to initiate the Centre and, CBST was formed in the year 2005. The centre is projected by DST as a ‘National Facility’ for research & development. The sustained efforts and inputs from the centre have contributed towards the greater goals of the nation and it’s significantly new developments such as Make in India, Skill India Mission, etc. The centre aims for a translational mode of work, by taking a working idea from the benches of a laboratory to the industrial scale for delivering an applicable product.

This innovative research with high intellectual input has resulted in development of very original and simplified systems for both analytical and preparative aspects of proteins. These methods are complimentary / competitive to conventional ones in efficiency and are being adopted by the industries both in India and abroad. This has made an important contribution for India both scientific and technological aspects to face the global challenges, resulting in products produced by Indian Industries contributing to its growth. This culture is successfully transferred to youngsters in India, in bringing a paradigm shift in the young researchers shaped at CBST.



**Dr. Krishnan Venkatraman**  
Professor and Director, CBST, VIT -  
Vellore



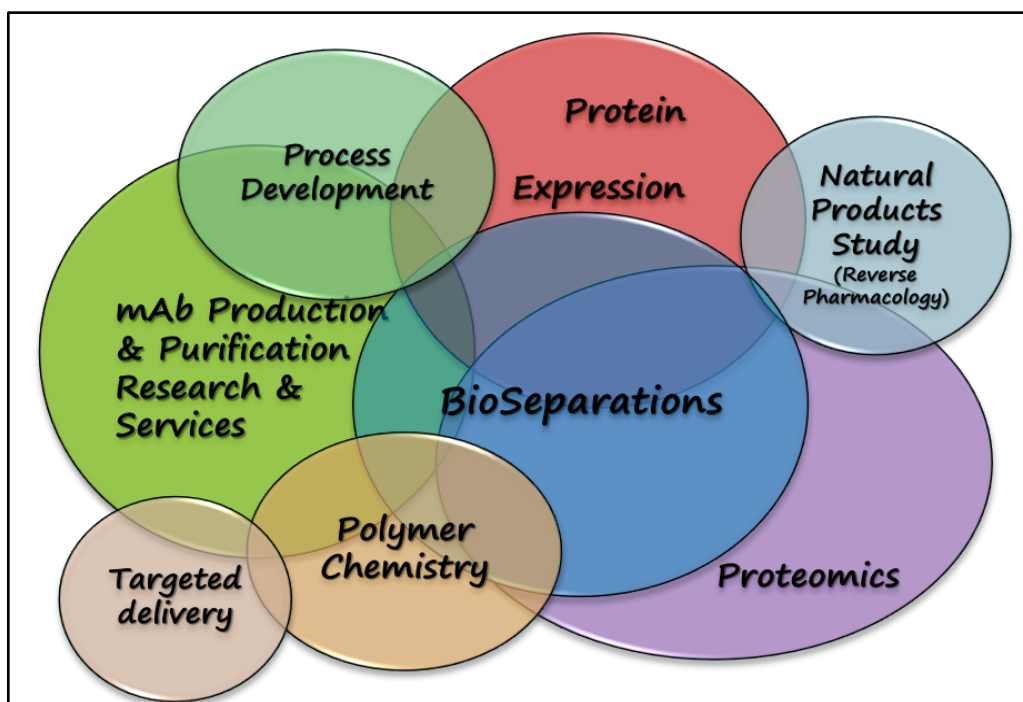
**Prof. M.A. Vijayalakshmi**  
Founder Director, CBST, VIT -  
Vellore

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Monitored by a steering committee composed of eminent scientists and top members of VIT University. The Centre developed to new heights and in May 2009, the Centre went through an independent “Performance Audit” by a committee headed by the President of Indian National Science Academy (ISA) and was recommended for up-gradation to an “Advanced Centre” with continued funding to maintain its high level potential and expertise research activities.

CBST, along with its initial facilities, currently features Chromatographic work stations (FPLC, HPLC, and four manual chromatographic workstations), Proteomic workstations such as Mass Spectrometer (QTOF & Triple Quadrapole ESI LC-MS), mammalian cell culture work, monoclonal antibody production, recombinant protein expression (comprising mammalian, yeast, bacteria and lemna expression systems). Renowned for its world-class innovative research and intensive training, CBST approaches research with multidisciplinary links involving state of the art-technologies focusing mainly on translational aspects.

CBST practices and has a setup of “Approach research with a high level of multidisciplinary links”. CBST is one of the rare Centres where the coexisting relation of Chemistry-Biology is realized and projects are done and made with this cross-talk relationship of different fields of Chemistry & Biology.



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The Centre revolves around multidisciplinary themes involving BioSeparation or the 'Science of Purification' as its major arm connecting various disciplines.

Linked together by Purification Science & Proteomics, the Centres moves the rest of the areas forward in to the area of translational research work paving path to success and development.

## **CURRENT HIGHLIGHTS**

- Haemophilia is a major genetic disorder affecting many people worldwide with strenuous therapies costing roughly around 300,000 – 400,000 \$ USD per year. CBST took it as an initial and important objective on making FVIII treatment available in India for haemophilia treatment. With expert advice and help from eminent people such as Dr. Alok Srivastava and through many adventurous measures and journey; CBST has successfully developed and taken the project in to prime focus with **Advanced Molecular Therapeutics or Amthera**; a Bengaluru based Biopharmaceutical Company, for making FVIII treatment available for haemophilia treatment in India.
- CBST has developed a polymeric dendrimer nanoparticle for targeted drug delivery for diseases such as cancer as one of its many important research focuses. With immense success, an international patent (USA) has been granted for the same. After a short period of financial struggles, **King Abdullah University of Science and Technology (KAUST), Saudi Arabia** showed their interest for the pre-clinical studies and development of the product in India.
- *Aloe vera* based extract has been identified for regeneration of pancreatic islet cells, which are responsible for Insulin production and insulin activity. This research finding is a world over search for regeneration of beta cells. CBST had got it early at 2009 as part of our project. With many guidelines and regulations from Ayush and DST-TIFARC taken in to account; the rules and regulations endowed by Ayush for pre-clinical studies, the product has been moved in to translation phase with **Arya Vaidhya Nilayam** for production as a product for its applications in diabetes treatment.
- COVID-19, caused by SARS-Cov-2 has recently claimed thousands of life around the world and is the leading disease today topping the charts for its communicable nature, detection and treatment. Considering the importance of COVID-19 based research, a recent COVID-19 diagnosis

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project has been sanctioned by **DBT – BIRAC** for the development of monoclonal antibody based diagnostics for detection of COVID-19.

- Malaria, caused by *Plasmodium falciparum* has become a major health burden in most tropical and developing countries posing serious challenges in specificity of the diagnosis and treatment to stop brain damage . Novel monoclonal antibody based diagnostics against specific and sensitivity to *Plasmodium falciparum* has been translated from the laboratory scale to industry through Span SARL for developing rapid diagnostic kits.

## **MAJOR PROJECTS AT CBST**

- **CBST – CIBA Project:** Central Institute of Brackish water Aquaculture (CIBA) and CBST have a joint venture Memorandum of Understanding (MOU) signed to facilitate advancement of knowledge on the basis of reciprocity, best effort, mutual benefit for the development of novel monoclonal antibodies.
- **Indo French collaborative project:** Indo-French consortium consisting of one academia & one industry partner funded by BIRAC and CEFIPRA for the development of a novel diagnostics for cardiovascular disorders.
- **NIRT – CBST Project:** With existing MOU between VIT and National Institute of Research on Tuberculosis (NIRT), CBST and NIRT have undertaken a hand in hand project for development of a rapid diagnostic kit for *tuberculosis* infection identification.
- **ICMR Project on Typhoid diagnosis:** Indian Council for Medical Research (ICMR) funded project is underway for development of novel peptide based diagnostics for specific detection of typhoid infection. A MOU has been signed for a collaborative study with Kanchi Kamakoti Childs Trust Hospital.
- **Biotechnology Ignition Grant (BIG):** CBST's project on purifying coagulation factor VIII from various sources was patented. This idea was turned in to a start-up and was granted the Biotechnology Ignition Grant, which focussed on a innovative idea of making affordable treatment of haemophilia available to India.

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- **CEFIPRA funded project on psychotic disorders:** Immunological characterization of major psychosis for identification of; a collaborative project between CBST and JIPMER, Pondicherry.
- **Department of Science & Technology (DST)** project entitled 'Engineering of beta-glucosidases for improved yield of glycoconjugates' in collaboration with IIT Delhi.
- Production of anti TNF- $\alpha$  using different expression systems for cost effectiveness. Collaboration with **M.S. University of Baroda**. Project under the **Department of Biotechnology** Programme Support on Improved Production and Processing of Therapeutic Proteins.
- Cost effective production of recombinant human coagulation factor VIII (F-VIII). Collaboration with **Christian Medical College (CMC)**, Vellore. Project under the **DBT Programme Support on Improved Production and Processing of Therapeutic Proteins**.
- **Bio-TIFAC**, Govt. of India, New Delhi. Development of novel process in isolating standardized extract of *Aloe vera* and its application for diabetes control. Bioprocess and Bioproducts Programme.
- **PALL Life Sciences**, Europe was involved with CBST for 'Study and evaluation of new chromatographic supports' for effective purification of biological molecules.
- Development of cryogel based bioreactor for monoclonal antibody production was done in connection with **Indian Institute of Technology**, Kanpur and later on with **Jacobs University Bremen**, Germany.
- **Karnatak University**, Dharwad had a joint collaboration with CBST for Production of monoclonal and polyclonal antibodies to novel recombinant lectin protein.
- **Jiwaji University** and CBST; had a joint research study involving the Production of polyclonal and monoclonal antibodies against Mycobacterium antigens.

## ACADEMIC AND INDUSTRIAL COLLABORATORS



## POPULATION AT CBST

- Total number of Internal Full-Time (IFT) PhD : 32

*Candidates with Government of India  
supported fellowships (present IFT)*

- ICMR research fellows (present) : 8
- CSIR research fellows (present) : 2
- DST research fellows (present) : 3
- Total number of External Part-Time PhD : 9
- Total Number of Project students : 3
- Total Number of Post-Doctoral Fellows : 2
- Total number of faculties : 9
- Total number of passed out PhD : 25
- Total number of passed out M.Tech (Research) : 13

## **RESEARCH HIGHLIGHTS**

- Total Number of Publications: 100 +

*Much publications weren't produced as CBST was more concentrated and focussed on product development & it's application.*

- International Patents (Awarded): 5
- International Patents (On-going): 2
- National Patents (Awarded): 3
- National Patents (On-Going): 5

## **FINANCIAL RESOURCES**

### **2005 to 2010**

- 1) Government Aided Support
  - a) DST : 3 crore
  - b) DBT : 2.3 crore
  - c) Total : 5.3 crores
- 2) Industrial Support
  - a) PALL Life Science : 40,000 EUROS
  - b) Agilent Technologies : 56 Lakhs
  - c) Total: : 1 crore (approx.)
- 3) Other Funding : 4 crores
- 4) Institutional Support (VIT) : Infrastructure, Management and Facilities
- (5) **Grand Total** : **10.3 crores**

### **2010 to 2017**

- 1) Government Aided Support
  - a) DST : 11.8 crores
- 2) Industrial Support
  - a) BIA Separations : 1 crore (approx.)
- 3) Other funding : 4.3 crores (approx.)



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4) **Total** : **17.1 crores**



*CBST was supported and funded by Indian Government and other funding agencies till 2017 and was functioning as an autonomous unit.*

**2017 to Present**





1) Other Funding : 2.5 crores  
2) Institutional Support (VIT) : 60 lakhs per year  
3) **Total:** **4.3 crores**

*Following 2017, CBST was integrated in to the VIT.*




**RESEARCH EXPERTS AT CBST**

1	 <p>Dr. Krishnan Venkatraman <i>Professor &amp; Director</i></p>	<p><b>AREAS OF INTEREST</b> Cardio Vascular Studies, Cell Biology, Metabolic disorders, Therapeutic Protein Expression and Mamallian Cell Culture.</p>
2	 <p>Prof. M.A. Vijayalakshmi <i>Professor</i></p>	<p><b>AREAS OF INTEREST</b> Biochromatography and Pseudo bioaffinity systems, Molecular Recognition and Interactions, Affinity Technology, Biorecognition and Downstream Processing Research.</p>

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3	 <p>Dr. Jayaprakash N.S <i>Associate Professor (Senior)</i></p>	<p><b>AREAS OF INTEREST</b> Bioremediation Research, Animal Cell Culture, Polyclonal &amp; Monoclonal Antibody Development and Immunotechnology</p>
4	 <p>Dr. Ayesha Noor <i>Associate Professor</i></p>	<p><b>AREAS OF INTEREST</b> Natural Products Research, Metabolic disorders (Diabetes and Obesity) research and Nutraceuticals</p>
5	 <p>Dr. Kishore Reddy <i>Assistant Professor (Senior)</i></p>	<p><b>AREAS OF INTEREST</b> Biosensors, Surface Chemistry, Polymer Material (Monoliths, Membranes, Beads) development, Organic Synthesis and Microfluidics</p>
6	 <p>Dr. Kamalanathan A.S <i>Assistant Professor (Senior)</i></p>	<p><b>AREAS OF INTEREST</b> Purification Science, Understanding the Molecular Features and Mechanism of Biomolecules.</p>

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7	 <p>Dr. Priyankar Sen <i>Assistant Professor (Senior)</i></p>	<p><b>AREAS OF INTEREST</b> Recombinant protein expression using plant based expression system, purification of enzymes and their Biophysical and Biochemical Characterization</p>
8	 <p>Dr. Sabareesh Varadarajan <i>Assistant Professor (Senior)</i></p>	<p><b>AREAS OF INTEREST</b> Biomolecular Mass Spectrometry and its applications with specific interest in Tandem Mass Spectrometry and Proteomics</p>
9	 <p>Dr. Sanjit Roy <i>Assistant Professor (Senior)</i></p>	<p><b>AREAS OF INTEREST</b> Structure and functions of proteins, Bioinformatics and Structural Biology</p>

More information: <https://vit.ac.in/center/faculty/cbst>

## **RESEARCH AT CBST**

### **A. CHROMATOGRAPHY AND PROTEOMICS**

The Separation Science and Technology field is the central axis of the Centre. It is being developed both as a science to understand the molecular recognition and also as a technology to be exploited for (i) Efficient product recovery; (ii) Development of studies on protein-protein, protein-DNA and

protein-ligand interactions; and (iii) As an exclusive tool for various proteomics approaches.

- Pseudobiospecific chromatography for recovery of high added value plasma proteins and recombinant proteins.
- Affinity traps - upstream and downstream in LC-MS approach: Applications demonstrated include for plasma proteins, PPD for tuberculosis, microbial fermentation broth.
- Chromatographic stationary phase development through ultra-high performance technology using connective interaction media (CIM) supports with all possible chemistries.
- BIA platform of excellence setup at CBST (BIA-PEC) with the BIA separations, a multinational company with its HQ in Austria.

### **B. MICROFLUIDICS DEVICES AS TOOLS**

During the last decade, there has been a surge in the life science research domain to develop efficient microfluidic devices to perform sample pre-treatment, screening and detection of biomolecules such as proteins from biological sources such as serum, milk etc.

Currently, we are working focusing on:

#### **1. Develop efficient microfluidic chips for protein purification for plasma proteomic applications (1 research project funded by SERB-DST; 2019-2022)**

Post translational modification (PTMs) events that alter the protein function play a vital role in health and disease of human beings. Glycosylation and phosphorylation are two major and commonly occurring PTMs and expression of PTM proteins is associated with the occurrence of various diseases like cancers, inflammatory conditions, congenital disorders and these proteins may serve as disease biomarkers for clinical diagnosis. However, the concentration of these PTM proteins is in nanomole's or in some cases picomole's and they are masked by high and middle abundant interfering proteins present in the sample. In this project, we are developing microfluidic chip with various affinity ligands that detect and efficiently capture both glycoproteins and phosphoproteins from Human serum in presence of high abundant proteins.

**2. Develop microfluidic based diagnostic chip for vitamin D detection (1 research project was funded by DBT; 2019-2022)**

Vitamin D, produced in liver, is an essential prohormone for human health. An individual with < 50 nmol of Vitamin D are considered as Vitamin D deficient and is interlinked with several diseases such as prostate cancer, cardiovascular diseases etc. Existing detection systems have several limitations like require large sample volumes, require high-end instrumentation to analyse vitamin D etc. Also, the test is very expensive (Rs. 1500) and is not affordable by large Indian population. Here, we are aiming to developing a point-of-care biosensor chip that is affordable and can sensitively detect Vitamin D in human serum using a drop of blood.

**C. AFFINITY TECHNOLOGY AND CHROMATOGRAPHY**

Pseudobiospecific ligand l-histidine is an inexpensive, highly stable, non-toxic ligand explored successfully over the last twenty years for the purification of immunoglobulins in immobilized histidine ligand affinity chromatography. It is of great interest to know the molecular recognition sites of IgG to immobilized l-histidine.

- We have used an in silico approach to explore the molecular recognition of l-histidine by IgG.
- We have assessed the feasible binding modes of histidine and its moieties at different sites of IgG and considered only those binding conformations which are exhibited via the imidazole ring NH group or any other OH donating group apart from the ones which are terminally conjugated with the support matrix.
- We categorized binding site into two categories; category I: inner binding groove and category II: surface binding groove and observed that the hinge region of IgG has most favourable binding pocket for L-Histidine and histidyl moieties.
- Serine and tyrosine residues on the hinge region make several significant interactions with L-Histidine and histidyl moieties, as hypothesized by Prof. Vijayalakshmi, the Hydrogen bond interactions making it a Hydrophobic interaction chromatography.

#### **D. AUTOIMMUNE DISORDER STUDIES**

Autoimmune diseases are a condition in which the immune system attacks normal, healthy tissues resulting in structural and functional damage to the host. The initiation and perpetuation of diseases is unclear and they are investigated in multi-dimensional approaches. At CBST research are conducted to understand the pathobiology of the autoimmune diseases at molecular and cellular levels. Focus of our research activity is on characterization of the anti-immune antibodies or anti-idiotypic antibodies and understanding of their role(s) in autoimmune pathologies. In the past, we have worked on anti-phospholipid syndrome (APS) antibodies, systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA) diseases.

At present we are working on following -

- Rheumatoid arthritis: Understanding the molecular features of the molecules involved in the inflammation or triggered due to inflammation and their consequences.
- Neuro-immunology diseases: Here we are working on the Major Psychoses disorder wherein, study is carried out to understand the dysregulation of the immune system and, if any, connectivity to the autoimmune disorder conditions.
- Inflammatory diseases: Neuro-inflammatory conditions and inflammatory conditions of eyes and their autoimmunity studies are under discussion and preparation for a future project work with associated partners.

#### **E. HIGH VALUE ADDED PROTEIN: Expression, Purification and Validation**

**Recombinant Therapeutic Proteins:** The Centre is developing Recombinant Therapeutic proteins of very high value with a “Gene to Vial” concept. This implies the gene construction, expression, optimization of the expression systems, purification, characterization and product formulation. Three important proteins with high value were chosen. They are anti- TNF  $\alpha$ , single chain variable fragment (ScFv), functional Factor VIII and ApoA1.

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- Functional coagulation Factor VIII (FVIII) expression has been done both in CHO and in glycol-engineered strain of Yeast (*Pichia pastoris*).
- Expression and purification of anti-TNF single chain variable fragments and increasing its avidity using Chemical dimerization studies.
- Expression of anti TNF-  $\alpha$ -ScFv in plants: *Spirodela punctata* or *Lemna* with invitro culture, growth & Expression of *Lemna*.
- Generation of wild type and variants of ApoA1 with studies on protection for Cardiovascular diseases with reduced effect of oxidation.

**Diagnostically important proteins:** We are also developing recombinant proteins that can be used in the field of Medical Diagnosis to detect diseases which would normally be very difficult to diagnose.

- Truncated HRP 2 against *Plasmodium falciparum* for detection of Malaria.
- Recombinant HRP 3 for detection of *Plasmodium falciparum*.
- Recombinant Brucella porin for detection of Brucellosis in humans and animals.
- Recombinant Salmonella porin for detection of Salmonella in humans and animals.

## F. STRUCTURAL BIOLOGY

At CBST, we use protein crystallography and associated biophysical techniques (surface plasmon resonance, Circular Dichroism) to understand the function of biological macromolecules.

We are working on the following challenges:

**1. RNA Modifying Enzymes:** Three-dimensional structure determination of tRNA adenosine deaminase and Dihydrouridine synthase from *Salmonella typhi*

**2. Lipid A Biosynthesis Pathway:** Lipid A biosynthesis is a conserved pathway which is required for the survival of nearly all Gram-negative bacteria that make this pathway an excellent antibiotic target. We are interested to elucidate three dimensional structure of various enzymes involved in this pathway (LpxC, LpxH, LpxL and LpxD from *Salmonella typhi*). Our long term research aim to develop small inhibitors against them.

**3. Structure and functional studies Proteins in *Enterococcus faecalis* involved in the formation of biofilms (Sortase A) :** *Enterococcus faecalis* (*E. faecalis*) is a Gram-positive bacterium, which is presently amongst the most prevalent multidrug resistant hospital pathogens. Its ability to develop quorum sensing (QS)-mediated biofilms further exacerbates its pathogenicity and triggers life-threatening infections. Sortase family proteins play an essential role in biofilm formation by *E. faecalis*. Till now three-dimensional structure of none of the sortase family proteins is known from *E. faecalis*. We aim to determine three dimensional structure of Sortase A and development of tight inhibitors against sortase A enzyme to prevent biofilm formation.

**4. Understanding, biochemical studies of glycoproteins from plants**

#### **G. CELL CULTURE AND ANTIBODY PRODUCTION**

CBST has keen interest in producing monoclonal and polyclonal antibodies, for the important value it has as modern day diagnostics. CBST has produced and is producing mAbs against various biological molecules of diagnostic interests for developing rapid diagnostics for early and specific detection of infectious diseases. CBST is also developing a mini-bioreactor module with a new super macro porous cryogel matrix for continuous production of monoclonal antibodies, which produces nine times more antibodies than the usual T-flask batch method. This cryogel work was adapted from the initial work of Prof. Ashok Kumar, IIT Kanpur. Some of the work includes,

- Monoclonal antibodies highly specific to *Plasmodium falciparum* have been developed.
- Anti-Human Serum Albumin monoclonal antibodies (Anti-HSA monoclonal antibodies) for depletion of HSA in proteomic studies.
- Antibodies against porin-protein of *Brucella* sp. and *Salmonella* sp. for specific detection of brucellosis and enteric fever & typhoid, respectively.
- Antibody against chlorinated ApoA1 (HDL) for early detection of Cardio vascular diseases.

#### **H. CARDIO VASCULAR STUDIES**



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CBST has extensively studied and continuing the search in the field of cardio vascular diseases (CVD), for understanding important and salient features of HDL, for their functions with which they are involved in various metabolic pathways that connect them to CVD.

Antibody based targeted approach have also been undertaken in order to develop a novel rapid diagnostics that can help to detect CVD at an early level.

A new research finding has led us to identify an *Aloe vera* based extract that has been known to drastically reduce triglycerides and VLDL levels, significantly impacting CVD and providing a new pathway for its application as a possible therapeutic agent.

## **I. NATURAL PRODUCTS AND DIABETES**

CBST is engaged in product development from Natural sources such as indigenous medicinal plants. Main focus is on developing Nutraceuticals with good understanding of the mechanism(s) involved in alleviating the pathology. The Centre has already marked its success in a project using *Aloe vera* as a supplement for alleviating Diabetes.

- In-vivo studies performed in streptozotocin induced diabetic rats with the *Aloe vera* extract.
- Extract was validated as per 'AYUSH' (regulatory structure for alternative medicine systems) guidelines.
- Human clinical trial in safety and efficacy evaluation has been carried out in collaboration with Laila Pharmaceuticals, Vijayawada.
- Understanding the molecular mechanisms of regeneration is underway and single molecule identified which is involved in one of the regeneration pathways.

## **J. TARGETED DRUG DELIVERY**

Polymer chemistry has played an important role in the synthesis, derivation, degradation, application and evaluation of biocompatible and biodegradable polymers, which can be used as drug delivery. Many of the pharmacological

properties of conventional free drugs can be improved through the use of polymeric drug delivery system.

- Poly (ethylene oxide) [PEO]: non-toxic, ion-transporting ability, water solubility, and non-recognition by immune system. A potential polymeric delivery system.
- Bouquet structure of PEO with two ends: One holding target agent and the other holding a functional compound at the other extremities.
- Plant based anti-cancerous agent: Lupeol, extraction, identification and purification from Aloe vera. Stabilization and targeted delivery of Lupeol using PEO dendrimers.

#### **H. PROTEIN BIOCHEMISTRY**

Among the various biomolecules studied and explored; CBST focuses and has keen interest in understanding and studying the nature of proteins for its beneficial nature from a natural source as well or as a recombinant product for its practical purpose in various applications. At the protein biochemistry branch of science at CBST, we explore the following

- Anti-TNF $\alpha$  ScFV isolation, purification and characterization.
- Benzothiazole dye based microfluidic system for amyloid detection, to develop as a diagnostic kit.
- Isolation purification and characterization of recombinant proteins as expressed in monocot plant systems.

#### **RESEARCH HIGHLIGHTS**

##### **National Patents Awarded**

1. Dendrimers, conjugates and methods there of (2018)
2. Double mutant coagulation factor VIII and methods thereof (2019)
3. Methods for producing recombinant peptides and protein from non-filamentous fungi and recombinant host cell there of (2019)

### **International Patents Awarded**

1. Methods for producing recombinant factor viii chains from non-filamentous fungi, their functional reconstitution and applications thereof (USA Patent) (2017)
2. Dendrimers, Conjugates And methods Thereof (USA Patent) (2017)
3. Double mutant coagulation factor VIII and methods thereof (EU Patent) (2018)
4. Monolith-based pseudo-bioaffinity purification methods for Factor VIII and applications thereof (EU Patent) (2019)
5. Methods for producing recombinant factor viii chains from non-filamentous fungi, their functional reconstitution and applications thereof (EU Patent) (2019)

### **STUDENT ACHIEVEMENTS**

- Mr. Arun Govind G, a Ph.D. Student at CBST, secured first place in poster presentation in a national conference: Proteomics Society India 2015 (PSI 2015) held at VIT University – Vellore. This fetched him a cash prize of 5000 INR.
- Ms. Neha Deora, a Ph.D. Student; attended Symposium on Diabetes and Adipose tissue Biology held in Keystone, Colorado (2017). This fetched her a prestigious travel award of 2500 USD from Bill and Melinda Gates Foundation.
- Mr. Avtar Sain, a Ph.D. Student from CBST; a finalist in the Euraxess Science Slam 2016 conference presented the work entitled ““Phage Therapy for infectious diseases”, held in Hyderabad.
- Mr. Ashish Khaparde presented “Development of Metal Ion/Chelate Monolith Micro-Fluid Device for Plasma Proteomics”
  - Proteomics Society India 2015, A national conference hosted by CBST at VIT University.
  - Monolith Summer School 2016 in France, fetching him a third best poster award in poster presentation.
  - Microscale Separation and Bio Analysis 2017 Conference at Netherlands.

## **CONFERENCES & WORKSHOPS**

- Downstream Processing and Validation with an Industrial Approach, a training program jointly organized by CBST and i-FAST, 2012
- Bio-Downstream Technologies Course, 2013
- Proteomics Society, India (PSI 2015) 2015 organized by Proteomics Society, India and CBST
- Workshop on Analytical Tools for Bio-Molecular Characterization, conducted by BIRAC and CBST, 2016
- COVID-19 disease control – Opportunities and Challenges for Vaccines, Bio-Therapeutics and Diagnostics, 2020.
- COVID-19 disease control – Drug Discovery and Development, Drug Repurposing and Alternative Medicine, 2020.

## **SERVICES PLATFORM**

- Mass spectrometry sample analysis: With two different types of Mass Spectrometer available, CBST encourages sample analysis to be performed for VIT residents and outsiders.
- BIACORE 3000 SPR: Using Surface Plasmon Resonance, it is possible to calculate the binding affinity such as protein-protein interactions.
- Both monoclonal antibody and polyclonal antibody production in mice and rabbits respectively, are rendered for antibody production with a defined collaboration. We have collaborated with Karnatak University, Dharwad for producing both monoclonal and polyclonal antibodies against fungal lectin protein and now currently a collaborative work between SPAN SARL, France and CBST, India is underway for production of Monoclonal antibodies against a malarial protein.
- Purification experiments are designed at lab-scale and scale-up advising is also provided.
- Molecular biology service platforms are also available at CBST.

### **REACH US**

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