

BIOQUEST India: A Global Biotechnology Forum for Knowledge-Based Innovation and Sustainable Development

Darpan Malhotra¹, Shyam Diwakar², Vural Özdemir^{3,4,5}, Bipin Nair^{2,*} and Sanjeeva Srivastava^{1,*}

¹Wadhvani Research Center for Biosciences and Bioengineering, Department of Biosciences and Bioengineering, Indian Institute of Technology Bombay, Powai, Mumbai 400076, India; ²Amrita School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam, Kerala 690525, India; ³Group on Complex Collaboration, Desautels Faculty of Management, McGill University, 1001 Sherbrooke Street West, Montreal, QC, H3A 1G5, Canada; ⁴Centre of Genomics and Policy, Department of Human Genetics, Faculty of Medicine, McGill University, Montreal, QC, Canada; ⁵Data-Enabled Life Sciences Alliance International (DELSA Global), Seattle, WA 98101, USA

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1. INTRODUCTION

Biotechnology and knowledge-based innovations are sought after by countries small and large for development and societal prosperity, not to forget for advancing the standards in medicine, health systems and services of nations. Key elements to this science and technology driven development agenda are exemplified by BIOQUEST India. This global biotechnology forum draws from local and regional advances in the Asia-Pacific and integrates it with key global scientific progress in life sciences.

In 2013, the BIOQUEST will continue to cover emerging and established areas such as Genomics and Translational Medicine, Biomedical engineering, Neurobiology and Computational Neuroscience, Bioinformatics and Computational Biology, Bioanalytical Techniques, Bioprospecting and Bioengineering and Biotechnology in India (Fig. 1). Each of these areas has a multidisciplinary approach to answer the biological questions that aim at alleviating human suffering and improve better standards of life. The BIOQUEST conference is scheduled at Amrita University, Kerala from 10-14 August 2013. The details of the conference are readily available at the BIOQUEST 2013 webpage: <http://amrita.edu/bioquest>. The scientific program highlights not only the key themes but also the eminent speakers who will be sharing the latest knowledge of the subject of their expertise. It is anticipated to offer a stimulating platform for experts and young scholars in the following areas of knowledge-based innovation as outlined below.

*Address correspondence to B. Nair at Amrita School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam, Kerala-690525, India; Tel: +(91-476) 2898318; Fax: +(91-476) 2896178; E-mail: bipin@am.amrita.edu; and Dr. S. Srivastava at Department of Biosciences and Bioengineering, Indian Institute of Technology Bombay, Powai, Mumbai-400076, India; Tel: +(91-22) 2576-7779; Fax: +(91-22) 2572-3480; E-mail: sanjeeva@iitb.ac.in

2. GENOMICS AND TRANSLATIONAL MEDICINE

Since the completion of the Human Genome Project, genomics and translational medicine have been at the epicenter of the post-genomics research and development agenda. With growing applications in personalized medicine, genomics and translational medicine need to strike the right balance to prevent premature translation and ‘lost in translation’ so that novel companion diagnostics can be expeditiously moved from discovery science to public health action. In India, the vast diversity of populations, both from genomics and environmental exposures standpoints, makes it nearly impossible to achieve optimal therapeutics with a one-size-fits-all treatment regimens, be they in common and rare disease contexts. Research efforts are now expanding in disease genomics, with a view to understanding disease pathophysiology, novel molecular targets, diagnostics for diseases, not to forget therapeutics and toxicogenomics [1]. Recently, research investments and outputs are becoming evident in transcriptomics and proteomics and other post-genomics fields that will be discussed in BIOQUEST 2013 in Kerala.

Transcriptomics research in India is investigating, for example, microRNA molecules and their roles in different biological processes along with the RNA entities. Focus is drawn on RNAi phenomenon and RNA sequencing approaches to answer some of the fundamental biological questions that are still not understood in-depth. On the other hand, the exploitation of proteomics in the identification of biomarkers for various diseases has been a major goal over the last decade in part due to extensive investments made in proteo-genomics by the Indian Government, an area of interest to readers in global personalized medicine [2].

Various proteomic platforms based on microarray and mass spectrometry have shown promising results thus far. Identification of vaccine candidates for many diseases is under clinical trials that are accompanied with a host of “omics” research to identify companion diagnostics or to

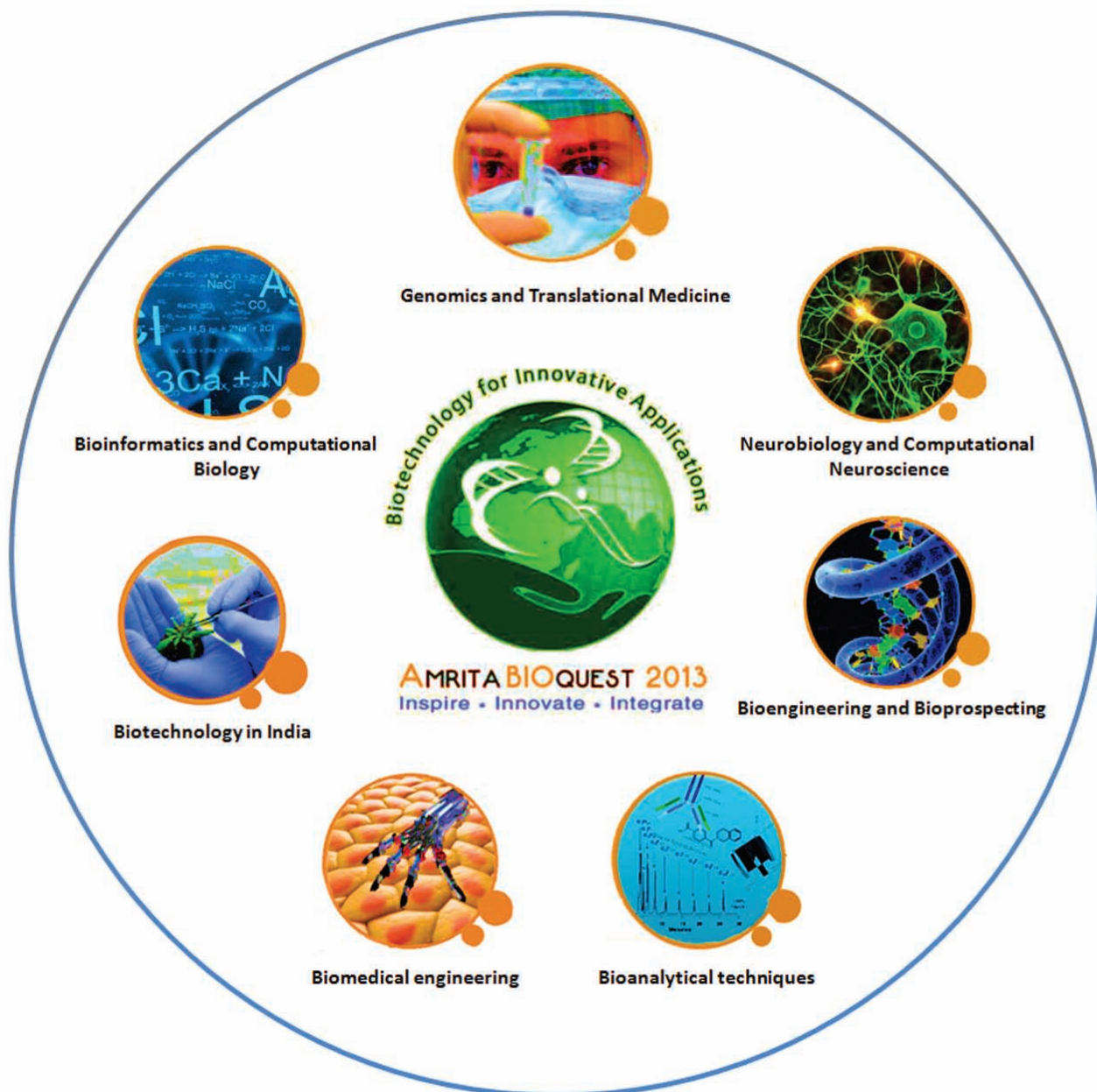


Fig. (1). Bioquest 2013 provides a platform to discuss research in Genomics and Translational Medicine, Biomedical engineering, Neurobiology and Computational Neuroscience, Bioinformatics and Computational Biology, Bioanalytical Techniques, Bioprospecting and Bioengineering and Biotechnology in India. It will provide an ideal platform for experts to Inspire, Innovate and Integrate in different areas of biotechnology pertaining to global personalized medicine and beyond in postgenomics medicine.

explain variability in therapeutic and safety related clinical end-points. Indeed, improving health of society remains as an integral part of the genomics and translational medicine agenda. The BIOQUEST 2013 global platform will contribute to and advance this vision by unpacking the latest research and contextualizing with the extant priorities in public health in India and the Asia-Pacific.

3. NEUROBIOLOGY AND COMPUTATIONAL NEUROSCIENCE

During the past two decades, the neurobiology research has made significant strides well beyond the realm of

molecular medicine to clinical applications. However, with the increasing number of reports of various neurological disorders like gliomas, meningiomas, Alzheimer's, *etc.* and their elevating annual fatalities, there is a pressing need to explore advanced technologies and overcome the existing loopholes. Moreover, the bottleneck in computational neuroscience has now shifted from data acquisition to data analysis where the investments are needed in the latter domain of science.

It is noteworthy that the detailed structural insights gained in the past on neurons, synaptic neurotransmission and glial cells have also provided insights at the functional

level [3, 4]. The next generation sequencing, cognitive modeling and other biotechnologies are also paving the way for new avenues of research to reengineer neurons for treatment of certain neurodegenerative disorders that have been a societal as well as clinical burden. Additionally, there is a significant interest to study the neurobiology of vision, perception, emotions and sleep as well as developmental biology. These issues on neurobiology and computational neuroscience will be discussed in this conference and should be of vast interest for the global life sciences community.

4. BIOMEDICAL ENGINEERING

Tissue-engineering approaches have progressed to an extent that clinical applications replacing damaged tissues with engineered ones have been reported lately [5, 6]. Biomedical engineering is providing implantable medical devices, biological scaffolds and tissue constructs that are facilitating critical medical treatments. These have also simplified the medical procedures and rationalized the work patterns. Medical treatments are highly dependent on the efficacy of the drugs prescribed but the mode of delivery decides its efficiency. Many research groups worldwide are working towards different drug delivery systems, which include controlled drug release and subsequent biodegradation. Certain medical calamities arise with the tissue damage or deterioration for which cell and tissue engineering is making immense contribution. It is imperative to globalize these success strategies through initiatives like BIOQUEST for the benefit of all.

5. BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

Another central area of discussion at BIOQUEST 2013 will be Bioinformatics and Computational Biology that holds great significance in data enabled life science research [7]. Structural bioinformatics and docking have facilitated pharmacological research and provided target candidates for a multitude of disorders. Computer aided drug design and pharmacoinformatics employ similar strategies for designing chemical structures compatible with target active sites and short-listing the best structures with the maximum predicted efficiency. 3D-mathematical modeling of micro and macromolecules are also generating immense information that is exploited in different basic research as well as target oriented ventures. Simultaneously, E-learning initiatives are promising projects, which are facilitating learning of high throughput laboratory techniques through open access portals [8]. Virtual laboratories provide a real-time experience to the rural or other difficult to reach and marginalized end users on getting equipped with the most demanded techniques provided at an end terminal with best information possible [9]. The information and communication technology tools along with supercomputing are promising for a newer generation of research which is progressive for a country's health, economy and educational sectors.

6. BIOANALYTICAL TECHNIQUES

Analytical techniques like HPLC, Spectroscopy are crucial for a range of applications on complex samples. NMR, X-Ray Crystallography and Mass Spectrometry are employed

for protein characterization and structural studies. Mass Spectrometry and other analytical techniques provide a good platform for the biomarker discovery, which is important to bring about better diagnostic and treatment strategies and improve the standards of healthcare across nations. The metabolomics and lipidomics provide strong research platforms for comparative analysis of the samples under study. The advancement in immunological techniques is a result of significant efforts of last two decades. Various techniques such as ELISA, FACS, antibody-based detection has proved to be useful for numerous research themes. Nanotechnology is a vastly promising research field [10], and recent advances made in the field of nano-based research for various therapeutic applications will be an important agenda in this conference.

7. BIOPROSPECTING AND BIOENGINEERING

The Bioprospecting themes to be discussed at the conference are emerging sectors concentrating on biotechnological management in a multitude of domains; healthcare, food sectors or agriculture in different parts of the world will be discussed. Similarly, bioengineering initiatives have been taken by some of the prominent research groups and their output has been commendable. Discussion on some of its key areas will be beneficial for research and development of India. A detailed discussion focusing on such areas at a global conference BIOQUEST would provide a roadmap for Bioprospecting and Bioengineering disciplines.

8. BIOTECHNOLOGY IN INDIA

Indian economy is contributing immensely for improvement of the quality research with the best possible infrastructure. India's contribution for innovation has been immense with novel research directly proportionate to the progressing healthcare sector. Biotechnology based industries in public and private sectors are already leading export of many products globally and their financial turnover every year demonstrates the success story. Global academia and industry collaborations are aiming at improvement in medical sectors. Large number of patents are filed every year in India and granted equally. Despite this success, the malnutrition and poverty is still affecting the overall progress of India. Biotechnology can be exploited to address such issues and it can be implemented over generalized discussions on global platforms for innovative and conclusive strategies.

CONCLUSIONS

There exists immense potential in basic and applied research, which can improve the existing healthcare scenario and improve the quality of life. Flow of ideas and active discussions among professionals are a necessity for scientific advances and prosperity that is globally significant. Forums such as BIOQUEST 2013 focusing on a multitude of multidisciplinary areas contribute to global progress of science and responsible biotechnology innovations for personalized medicine, which together aim at alleviating suffering and advancing the quality of life and human development in resource-limited regions.

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