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Change
Empowerment
Replication
Social
Innovation
Connectivity
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Innovation
Participatory
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Change
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Amplification
Community

Social Innovation



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Biotechnology Industry Research Assistance Council
(A Government of India Enterprise)



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chief editor's take



Social innovation through technology especially biotechnology is transforming lives in India and across the globe. BIRAC is also playing an active role in catalysing innovations in the biotech sector that aim to bring positive societal change. Through our efforts we have supported a large number of Innovation Research projects by Start-ups and SMEs. They have resulted in over 23 products/technologies in all areas of biotechnology - several of these have a strong component of 'social innovation' at the core. We have also initiated a focused programme on Social Innovation for

Products, Affordable and Relevant for Societal Health - SPARSH. The first two calls of this programme focused on identifying innovative technologies for maternal and child health and the recent call focuses on sanitation and hygiene. We have also partnered with WISH Foundation to help mentor our innovators for last mile delivery along with interface with State agencies. We hope that our multiple initiatives will help usher positive change in the society. ■

Renu Swarup

Senior Adviser/Scientist 'H', DBT, GoI. &
Managing Director, BIRAC

leader



The mandate of BIRAC is "to stimulate, foster and enhance the strategic research and innovation capabilities of the Indian biotech industry, particularly start-ups and SMEs, for creation of affordable products addressing the needs of the largest section of society". This philosophy echoes the definition of social innovation which aims to address challenges in healthcare, energy and food security for public good.

The roots to deliver high quality social innovation lies in understanding societal needs, design solutions that bridge gaps and understanding local conditions and deliver in a reliable and sustainable manner. Through our flagship schemes such as BIG, SBIRI, BIPP and SPARSH, BIRAC has supported several biotechnology innovations that are playing a transformative role in society be it new vaccines such as Rotavac that provide immunity to children against rotavirus that causes severe diarrhoea in children leading to mortality, products that provide access to cancer treatment or diagnostic tools which can detect chronic and infectious conditions in low resource settings. Through our Social Innovation Immersion Programme (SIIP), we are creating a pool of social entrepreneurs who through high engagement with communities identify needs and then aim to design product solutions with potential for translation.

Our partnerships, especially with Bill & Melinda Gates Foundation (BMGF), the Wellcome Trust and the WISH Foundation,

aim to strengthen our efforts in creating an ecosystem to develop high quality products and solutions for societal benefits. The 'Grand Challenges' initiative in India which was launched in 2013 jointly by the Department of Biotechnology, GOI, BMGF and BIRAC as project management partner is starting to take roots in India through three grant programmes which have been launched under this umbrella.

It is important for us to learn from other areas where technology led social innovation is transforming lives and livelihoods- be it in bringing electricity, especially solar energy, to millions of Indians who are off-grid or interventions for access to clean sanitation and hygiene to communities.

It is crucial for BIRAC to connect with other aligned organisations and their CSR initiatives to explore modes of engagement to amplify our activities in the social innovation space. We look forward to initiating new partnerships that aim to improve lives of citizens of the country and the world. ■

Prof. K. VijayRaghavan

Chairman, BIRAC & Secretary, DBT, Govt. of India

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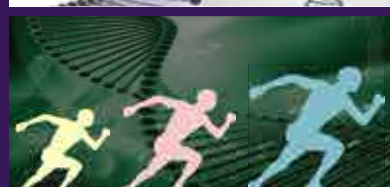
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Social Innovation in Healthcare

Wellness, Online!



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BIRAC Innovators Meet 2015

Invigorating the Biotech Innovation Ecosystem

BIRAC organized its 4th Innovators Meet at Heritage Village, Manesar, Gurgaon, on 15th-16th September 2015. Attended by over 250 delegates from Government, academia, industry, start-ups and budding entrepreneurs, the theme of the meet was **Invigorating the Biotech Innovation Ecosystem**.

Day 1

In her welcome address, Dr. Renu Swarup, Senior Adviser, DBT and MD, BIRAC set the context of the meet by highlighting the nurturing environment that BIRAC provides to biotech innovators. She also outlined the rapidly growing role of BIRAC in creating and catalysing the biotech innovation ecosystem across the nation.

Prof. K. VijayRaghavan, Secretary DBT & Chairman BIRAC, in his inaugural address highlighted the broad contours of an innovation ecosystem and the evolution of the Indian Biotech Ecosystem that is increasingly becoming more vibrant as new start-ups take shape. He underscored several other changes in this direction, such as establishment of 'makerspace' in India for new medtech startups to design and develop prototypes as well as shared workspaces. He also pointed out that a new culture of doing innovations needs to be established and the gap between startups, industry and academia needs to be bridged through partnerships.

Keynote

Delivering the Keynote Lecture, Dr. M. K. Bhan, Former Secretary, DBT & Former Chairman, BIRAC spoke about the maturing of the global biotechnology domain as it connects to other innovation domains. He noted that the Indian Biotechnology Ecosystem has grown and its amplification would need an inspired strategy that takes into account the needs of all stakeholders, especially those of young entrepreneurs and innovators.

Awards

The inaugural session was followed by announcement of the prestigious BIRAC Innovator Awards. The awards were presented to four innovative companies for exemplary innovation in the field of Biotechnology (see Table on Pg. 5). In addition to Innovator Awards, the Grand Challenges India Grants – for the All Children Thriving Call, a collaborative initiative of DBT, Bill & Melinda Gates Foundation and BIRAC, were officially announced on the occasion (see table on Pg. 6). BIRAC Innovator awardees made presentations about their cutting edge innovations and presented their results and journey of their success stories, inspiring the audience.

The Innovators Meet was also an occasion for the unveiling of BIRAC publications – BIRAC Innovators Compendium 2015, BIRAC Resource Facilities report, and 1st BIG report by Prof. K. VijayRaghavan, Prof. G Padmanaban, Dr. M.K. Bhan and Dr. Renu Swarup.



Panel Discussions

Innovators Meet also provided a platform for serious brainstorming on issues and challenges associated with development of innovation ecosystem in India.

The first panel discussion titled “Building and Scaling Biotech Innovation Ecosystem – Brick by Brick” was led and moderated by Dr. Renu Swarup. Other discussants were Prof. Anil K. Gupta, IIM Ahmedabad; Dr. David Gill, MD, St. John’s Innovation Centre, Cambridge; Dr. C. B. Sanjeevi, Professor, Department of Medicine, Karolinska Institutet; Ms. Deepanwita Chattopadhyay, Chairman & CEO, IKP Knowledge Park; and Mr. Sharad Sharma, Co-founder and Member, Governing Council, iSPIRT Foundation.

In her opening remarks, Dr. Swarup emphasized on the role of innovation ecosystem for sustenance of new ideas and importance of hand holding and mentoring for nurturing these ideas into final products and processes. The forces and factors involved in building and nurturing an innovation ecosystem were discussed. Prof. Anil Gupta focused on the urgent steps needed to provide a further boost to the emerging innovation ecosystems across several geographies in India. He emphasized

that the emerging ecosystems in India should aim at partnering with other global ecosystems. Dr. David Gill showcased how dynamic platforms and networks that encourage innovations have helped create the Cambridge Phenomenon - the biggest innovation hub in Europe with 1500 technology firms in and around Cambridge. He also highlighted the seminal role of the University of Cambridge and its interface with other building blocks of the innovation ecosystem – banks, funding agencies and mentors. Dr. C. B. Sanjeevi, described the entrepreneurial culture of Karolinska Institutet where the hospital and its research wing have played a central role in orchestrating a culture of innovation through open communication channels between its various stakeholders. Ms. Deepanwita Chattopadhyay provided a perspective on the evolution of innovation hubs in Hyderabad and Bangalore and highlighted the gaps that needed to be bridged. Mr. Sharad Sharma provided a broad view of the role being played by policymakers and organisations such as iSPIRT Foundation in trying to move the centre of gravity of innovation from a service orientation towards a product orientation nation.

The panel discussions that followed focussed on various



BIRAC Innovator Awards 2015

Organisation	Area	Achievement
Mother Dairy Fruit & Vegetable Pvt. Ltd. Noida	Agriculture	Development of genetically engineered <i>Brassica juncea</i> for heterosis breeding and yield improvement
Nova Lead Pharma Pvt. Ltd. Pune	Healthcare	Development of a generic cardiac drug “Galnobax” for potential treatment of Diabetic foot ulcers
Varuna Biocell Pvt. Ltd. Varanasi	Industrial Biotechnology	Indigenous production of dextranase using Solid State Fermentation (SSF) technique
Shantani Proteome Analytics Pvt. Ltd. Pune	Healthcare	Development of a technology platform that captures and identifies specific protein targets of the bioactive compounds in sub-cellular locations.

Grand Challenges India Grants - All Children Thriving Call

Organisation	Achievement
Society for Applied Studies, New Delhi	Improving linear growth of children in low income settings through household supported integrated nutritional, environmental WASH and care interventions in pregnancy and early childhood.
SRM Institute for Medical Science, Chennai; Flinders University of South Australia and South Australian Health and Medical Research Institute	An intergenerational prebiotic approach to establishment of a healthy colonic micro biome in infants.
Centre for Plant Molecular Biology and Biotechnology, Coimbatore In collaboration with Home Science College and Research Institute, Madurai and University of California Davis, California, USA	Enhancing nutritional security of pregnant women, infants and young children in rural households of Tamil Nadu, India through agricultural intervention.
Translational Health Science and Technology Institute (THSTI), Faridabad	The humble absolute neutrophil count as a measure of mucosal inflammation and as a predictor of linear growth in Indian infants.
National Institute of Biomedical Genomics, Kalyani in collaboration with Regional Centre for Biotechnology, Faridabad and THSTI, Faridabad	Development of methods to identify mothers at risk of preterm birth and intrauterine growth restriction resulting from maternal stress.
Mahatma Gandhi Institute of Medical Sciences, Wardha with Kings College, London and Mamta Health Institute for Mother and Child	Low-cost salivary progesterone testing for detecting the risk of preterm births in rural community settings of India.
Translational Health Science and Technology Institute (THSTI), Faridabad	Creation of a Biorepository and Imaging Data Bank for Accelerating Evidence Generation to Facilitate Children to Thrive.

dimensions of innovation in domains of Healthcare, Agriculture and Clean Energy.

Panel I – Healthcare: Strategies for addressing Antimicrobial Resistance (AMR) issues in India

Lead Presenter & Moderator: Dr. T S Balganes, CSIR Centre for Mathematical Modelling and Computer Simulation

Panel Members: Prof. Ramanan Laxminarayan, PHFI; Dr. Ajith Kamath, Pfizer; Dr. Kamini Walia, ICMR and Dr. Anand Anandkumar, Bugworks

The panel discussion focused on the need of urgent attention on a gamut of issues – from new R&D for antimicrobial agents, to behavioural change in adherence during antimicrobial treatment and measures required to improve public health and understanding. The recommendations were:

1. Innovative ideas should be tested and adopted to address infection control in nosocomial settings.
2. More stress on Vaccine development and usage to reduce use of antibiotics.
3. Challenge calls on devices & diagnostics, drug discovery, ancient Ayurveda or natural products usage, software or apps, ICU devices to address AMR issues.
4. Policy discussions between ICMR, Industries, PHFI, MCI for parliamentary act on regulating the OTC sales of antibiotics at pharmacies.
5. Strategy to promote adoption for practices found to be effective in reducing the AMR related issues.
6. Initiative to be taken in the Agriculture and Poultry industries to address the AMR related problems. Antibiotic stewardship programme and policy introduction in veterinary area is a necessity as antibiotic usage is almost twice for animals as compared to humans.
7. Identification of the relevant ICT technologies required for monitoring the Surveillance data for antibiotic resistance and big data analysis of surveillance programmes.
8. More awareness in the Society, may help in overcoming AMR related issues.

Panel II – Agriculture Electronics: Opportunities in Agriculture Electronics: Revolutionising Productivity and Quality

Lead Presenter: Dr. David Bergvinson, ICRISAT

Panel Members: Dr. Nabarun Bhattacharyya, C-DAC; Prof. Narendra Ahuja, Information Technology Research Academy; Mr. Ragunathan Kannan, Sathguru Management Consultants.



Dr. R.A. Mashelkar at the Meet



Panel Discussion - Agriculture Electronics: Opportunities in agriculture electronics: revolutionising productivity and quality

‘Precision farming through agricultural electronics’ is a rapidly growing area which is expected to significantly boost agricultural productivity. The panel explored answers for questions such as – What are the new technologies driving precision farming? How are they impacting crop management patterns? What are the issues that impact their adoption? What policy issues will impact this field? After elaborate discussions, following recommendations were made by the panellists:

- Effective steps may be taken towards harnessing strength in IT to cater to the needs of agriculture and environment.
- Under the sustainable developmental goals, development of cloud-enabled geospatial/temporal infrastructure is crucial for agriculture.
- Development of digital technologies to manage risk and opportunities is important for modern agriculture.
- Development of ecosystem of integrated digital services offered through collaboration of public and private sectors and farmers would help in further development in the field of agriculture in India.
- Development of digital feedback loop within agri-supply-chain is essential for leveraging data for more responsive and efficient farming systems.
- An urgent requirement of a well-defined policy for making data standards for flow of information in agriculture.
- Development and usage of IT tools for online sale and purchase of agricultural goods to be encouraged.

Panel III – Healthcare: It’s Written in the DNA: Integrating Big Data Analytics in Personalized Medicine for Standard Care

Lead Presenter: Dr. Ramesh Hariharan, Strand Life Sciences

Panel Members: Dr. Partha P. Majumder, NIBMG; Mr. Sam Santhosh, Medgenome; Dr. Sudeep Gupta, ACTREC; Dr Mithua Ghosh, Triesta Science-HCG



Panel Discussion - Clean Energy: Biotech Solutions for Swachh Bharat - Way Towards Clean Energy

Driven by rapidly evolving technologies such as the Next-Generation Sequencing, personalised medicine is gaining traction. The panel’s mandate was to address issues, national & global, that need to be resolved to make genomics based diagnostics a ‘standard of care’ for a range of health conditions including cancer. How the information about mutations is helping treatment choices and therapies? What are the issues that impact the adoption of personalised medicine by healthcare providers, especially clinicians? How do experts see the development of this sector in India, and in the western countries? What policy issues should India be considering for this field to grow and impact healthcare? The recommendations of the panel were:

- Data Sharing initiation should be taken up so that the entire nation gets the benefit by accessing the sequencing data.
- Speed up the gene therapy editing trials.
- Cancer patients need to be sequenced to analyze the clinical exome and whole genome for discovery of biomarkers.
- Strong collaboration needs to be encouraged between academic institutions, industries and hospitals.
- Government should provide subsidies and reduce the custom duties on reagents, machines, diagnostic kits, etc.

Panel IV – Clean Energy: Biotech Solutions for Swachh Bharat-Way Towards Clean Energy

Lead Presenter & Moderator: Dr. R.R. Sonde, Thermax

Panel Members: Prof. V.S. Chary, Administrative Staff College of India (ASCI); Mr. Dinesh Bindinganavale, Pradin Technologies Pvt Ltd; Mr. Mainak Chakraborty, GPS Renewables; Dr. Vishwanath Dalvi, ICT



The panelists discussed the current issues and new technologies impacting waste to energy conversions. How can we sustainably integrate the solution(s) in an urban or a rural context? What policy changes needed to enhance role biotech sector in the field of Clean Energy and success of Swachh Bharat initiative? The recommendations of the panel were:

- Biotechnological solutions are needed for all kinds of wastes (MSW, Sewage from human waste, industrial waste, agricultural waste and plastic and e-waste).
- BIRAC should focus on getting projects on gaseous fermentation.
- Integrated processes like coupling biochemical with chemical may become quite effective.
- Technologies focussing on fuel cells, conversion of synthesis gas to other biomolecules and converting methane to liquid form should be encouraged and supported.
- Human resources should be attracted to work towards finding waste management solutions.

Poster Session

The poster session comprised of 27 presentations wherein the BIRAC innovators presented salient aspects of their work. The three best presentations recognised by the Evaluating Jury were from – Coeo Labs, Bangalore; Rope Production Centre, Madurai; and Geo Biotechnologies Pvt. Ltd., Bangalore. Appreciation awards were also endowed to three innovators namely - Dr. Vivekanandan Perumal; Alfa Corpuscles Pvt. Ltd; and India Glycols Ltd.

BIRAC Huddle

The BIRAC Huddle was an informal get-together of innovators with senior stakeholders of the innovation ecosystem in India, whereby the innovators got the opportunity to discuss their concerns about the growth of the Biotech innovation ecosystem and also put forward suggestions to address those concerns and challenges.

Day 2

The second day started with a welcome note by Dr. Renu

Swarup and introductory remarks by Prof. K. VijayRaghavan. Dr. R. A. Mashelkar, Chancellor, AcSIR & National Research Professor, National Chemical Laboratory, the esteemed guest in his Plenary Talk (Building India as an Innovation Nation). emphasised on the importance of patenting the research prior to publishing. He connected the power of patenting with prosperity. He also emphasised that India as a country needs to identify the potential present with Indian Labs and urged to utilise this research for developing innovative indigenous solutions. Dr. Mashelkar suggested that knowledge created using funds should be channelized to create revenue streams and urged the scientific community to find innovative solutions through Indian science and technology which can make a global impact.

Interaction with Mentors

The Innovators Meet provided an opportunity to BIRAC supported innovators to pitch their innovation to a panel comprising of eminent scientists, angel investors and venture capitalists. Post the pitching session, the panel mentors provided brief comments for all the innovators. Prof. G. Padmanaban, INSA Senior Scientist emphasised on the lack of availability of venture funds for start-ups. He suggested inclusion of physicists, engineers and various other professionals in the process of innovation. Mr. Nitin Deshmukh of Kotak Private Equity suggested to the innovators to look for long term investors and the need for BIRAC to collaborate with Venture Capitalists as potential sources of second phase of support. Mr. Siraj Dhanani from InnAccel looked at the Israel model of start-ups and suggested higher participation of public enterprises / governments in procurement of devices and technologies to boost the venture capitalist's faith in the innovation and leading to more venture funds for technology development.

Mr. P. R. Ganapathy, Villgro Foundation and Dr. Shirshendu Mukherjee, Wellcome Trust urged the innovators to assemble cross functionality in their teams from the very beginning and involve clinicians, manufacturers, distributors and scientists in the process of innovation. ■

Social Innovation

Lighting Lives Sustainably



Harish Hande
Managing Director,
SELCO-India

Dr. H Harish Hande is Managing Director, SELCO-India, which he co-founded in 1995. Dr. Hande earned his Doctorate in Energy Engineering at the University of Massachusetts (Lowell). He has an undergraduate degree in Energy Engineering from the Indian Institute of Technology, Kharagpur. Dr. Hande serves on the boards of many organizations, both national and international. He was awarded the Ramon Magsaysay Award in 2011.

What are your thoughts on driving positive societal change through use of technology? Do social innovators have different DNA than mainstream innovators? How did the idea of SELCO take roots?

Dr. Harish Hande (HH): To have a positive change in the society - especially for the under served communities - one needs to understand the whole ecosystem that would surround a potential intervention. Else we would always come up with temporary solutions, also called band-aid interventions. Technology is only a small part of that ecosystem. Once the ecosystem is mapped, then only selection of the technology needs to happen.

I am not sure if social innovators have a different DNA than mainstream innovators. It is like comparing Edison and Tesla. One was a brilliant entrepreneur while the other a maverick genius. It all depends what drives the innovator - money, just the excitement to solve a problem (social or not), sensitivity to social issues, guilt, etc.

The idea of SELCO takes roots from the fact that couple of us felt that there was a wonderful linkage between sustainable energy and poverty eradication. We felt that one should make development as the central theme for solving social issues in a sustainable manner.

What are your thoughts about the landscape of social innovation in India? How do you see this space evolving?

HH : India is a country that is a paradox in nature. It is a mix of a developed, developing and underdeveloped country. There

is a plethora of social issues. This presents a huge opportunity to solve these problems and establish benchmarks for other developing countries to follow. Take any sector - water, health, energy, livelihoods or vulnerability, there are numerous problems that beg for social innovations to happen, and here sky is the limit.

I see the space very confused and unfocussed. There is talk of scale even before a problem statement has been articulated. There are investors lined up even before anyone has tested a proof of concept. "Fortune at the Bottom of the Pyramid" has been taken too seriously and with no respect for the poor or the ecosystem. Top schools teach social innovation in silos with knowledge that is more statistical in nature rather than pragmatic. The space follows buzz words (like micro-finance, micro-grids etc) rather than creating a long term path for itself.

What lessons have been learned from the journey of SELCO?

HH : Lessons learnt are plenty. Many of the failures occur because of our inherent (or one would say sub-conscious) arrogance to approach a problem with a ready made solution. Though SELCO is well grounded in its approach, with personnel mostly from the local areas - it still needs to spend time assessing the needs by reading between the lines of language, culture, and geographies. Some of the biggest lessons are that formal degrees and qualifications do not bring in any added value to real social innovations - it depends on the person's attitude to be truly inclusive in the thinking process - a character that is not taught in schools.

Contd. on pg. 15

Grand Challenges Initiative

Supporting Innovations in Health Care

The Grand Challenges Initiative is a family of initiatives that aim to encourage and foster innovation in health care to address the myriad problems afflicting the globe. Over the past years, the Grand Challenge has proven to be a successful model in encouraging and driving innovations for global health and development priorities.

Grand Challenges India (GCI) was launched in 2013, jointly by the Department of Biotechnology, Govt. of India and the Bill & Melinda Gates Foundation. BIRAC is the implementing partner of GCI and hosts the Programme Management Unit. The aim of this initiative is to foster Indian innovation and research to develop affordable and sustainable solutions that improve the health and well-being of the Indian population.

The GCI partnership encourages research and development that can contribute to the discovery of new scientific means, methods and technology to solve issues related to inequities in health and human development. Three grant programmes have been launched under GCI initiative till date namely *Achieving Healthy Growth through Agriculture and Nutrition*; *Reinvent the Toilet Challenge* and *All Children Thriving* and 17 researchers and social entrepreneurs from across the country have been funded. The aim is to promote innovation aligned with achieving the Sustainable Development Goals (SDGs) 2 (end hunger, achieve food security and improved nutrition and promote sustainable agriculture); 3 (ensure healthy lives and promote well-being for all at all ages) and 6

(ensure availability and sustainable management of water and sanitation for all).

Annual Grand Challenges Meeting 2015

The Bill & Melinda Gates Foundation and the Ministry of Science and Technology of China (MOST) co-hosted the 11th Grand Challenges Annual Meeting, together with Grand Challenges Canada, the United States Agency for International Development and Wellcome Trust, from October 19-21 at Beijing, PRC.

The theme of the meeting was 'Innovating to Drive Development: Collaborating to Win Challenges'. Attended by over 800 researchers, scientists, as well as high-level representatives from governments and organizations across the globe, the meeting comprised of scientific tracks, plenary sessions, roundtables, poster sessions and other sessions.

At the meeting, the Bill & Melinda Gates Foundation and the National Natural Science Foundation of China (NSFC) announced plans to establish a "Grand Challenges China Programme" in the near future.

According to the Memorandum of Understanding, similar to GCI, the Gates Foundation and NSFC will jointly select and fund research proposals on major infectious diseases, reducing maternal and child mortality, translation, agriculture, food and nutrition, as well as other areas that will benefit people in need in China, and beyond.

World leaders adopted the SDGs or the Global Goals in September 2015 that aim to address problems like poverty, illiteracy, disease and overall lack of quality health care for all, among other key issues. In order to achieve these targets, it is crucial to intensify efforts to foster frugal innovation and research around the world. The Annual Grand Challenges meeting served as a platform to discuss potential solutions centered on the power of research and development of innovative solutions to achieve the Global Goals.

The Indian delegation included grantees from various GCI projects including the seven grantees awarded funding under the *All Children Thriving* programmes at the Innovator's meeting held in September 2015.



Courtesy: ©Bill & Melinda Gates Foundation/Shawn Koh

All Children Thriving grantees announced at Innovator's meeting

The winners of the *All Children Thriving* grants were awarded the certificates for funding at the 4th Innovator's Meeting on September 15 at the Heritage Village Resort in Manesar, Gurgaon. The awards were given by Prof. K. VijayRaghavan, Secretary, Department of Biotechnology (DBT), Government of India. Seven winners were selected for funding – one full grant of USD 2.5 million for four years and six seed grants of USD 500,000 for two years.

The project awarded the full grant aims to improve linear growth of children in low-income settings through household supported interventions using nutritional environment and care in pregnancy and early childhood. The six seed grantee projects had proposed projects ranging from genomics, agricultural interventions and counting neutrophil counts to improve maternal and neo natal health.

The 'All Children Thriving' grants aim to develop multi-sectoral



interventions that can reduce the burden of preterm birth, stunted postnatal growth, and impaired cognitive development. The grant programme aims to encourage proposals that concentrate on a vital stage of life where effective interventions can be incredibly beneficial in changing the lives of millions of children. It is imperative to develop cost effective technologies and mechanisms which can drastically improve child health and survival.

India has one of the highest child mortality rates and under-five deaths in the world. In India, an estimated 26 million children are born every year. An estimated 1.27 million children die before completing 5 years. 81 percent of under-five child mortality takes place within one year of birth which accounts for nearly 10.5 lakh infant deaths and 57 percent of under-five deaths take place within the first one month of life accounting for 7.3 lakh neo-natal deaths every year in the country.



Visit to an ongoing grantee project under the 'Achieving Healthy Growth through Agriculture and Nutrition' grant programme

Ensure year-wise nutritional food security to Indian women through community level implementation of Domestic Solar Conduction Dryer

Grantee: Science for Society, Mumbai, Maharashtra

Post-harvest loss in India is massive even though India attained the second highest position in the world in producing vegetables and fruits. An estimated 30 percent of the vegetables and fruits are rendered unfit for consumption each year due to spoilage after harvesting, negligent attitude towards post-harvest losses, absence of food processing units and unavailability of modern cold storages.

It is estimated that the post-harvest losses touched an alarming amount of Rs. 2.13 lakh crore in 2011-12. Thus, reduction of post-harvest food losses is a critical component of ensuring future food security in the country. Women are at the receiving end of the food shortage since they prefer prioritizing feeding their family first.

The programme aims to introduce a solar conduction dryer, a solar powered food dehydrator that reduces moisture content in agro-animal produce so that women farmers and rural women can preserve seasonal produce up to 1 year.

Science for Society established a pilot project at Hathmare village in Aurangabad district and provided 40 solar dryers to families for domestic dehydration of fruits and vegetables. Their dietary

consumption is being monitored with the use of a calendar.

The project has developed a system of value chain partners in rural centres of Maharashtra to create awareness, train and equip 200 small-holder women farmers to dehydrate locally available low cost seasonal food and use these products in making daily cooking recipes to improve feeding practices and overcome malnutrition. Initial testing of the vegetables shows that 70 – 80 percent of nutrition value of the products was retained even after the drying process. After assessing the viability and success of such a model, it can be expanded and scaled up across the country. ■



BIRAC Innovators

A step at a time

Identifying promising innovation ideas and nurturing them to a fruitful conclusion lies at the heart of BIRAC's mandate. Here we showcase a few of the many successes, achieved by innovators across the country in collaboration with BIRAC.



The Problem

Leuconostoc mesenteroides is a bacterium ubiquitous in soil. It mainly attacks sugarcane by entering cane through cuts that expose tissue. The bacteria enter the juice-rich interior and their activity results in the conversion of sucrose to high molecular weight polysaccharides known as dextrans. The name dextran represents a group of related polymers whose structures and properties can vary widely depending on the source organism and environmental factors such as sucrose concentration, pH, temperature and aeration.

The presence of dextran in the juice acts to increase the viscosity. This leads to "gumming" of the factory machinery and formation of a slimy layer that blocks filter cloths. The viscosity also leads to reduced heat transfer and

Indigenous Production of Dextranase Using SSF Technique Phase 1 and Phase 2

Varuna Biocell Pvt Ltd

slowing of evaporation rates. The effect dextran has on the crystallisation process can be dramatic by preventing the extension of lateral faces, leading to needle shaped crystals. During evaporation the dextran concentration increases which interferes with crystal formation and crystal separation. This increases sucrose loss to the final molasses. Processing capacity and yields are decreased and plant shutdown may be required for equipment cleaning.

The conventional remedy to any problem caused by dextran in process is the addition of the enzyme dextranase, which will hydrolyse the large dextran molecules into smaller oligosaccharide products. However this is an expensive treatment largely because of the cost of the enzyme.

Varuna Biocell has successfully produced Dextranase using SSF technique. From the economic point of view use of dextranase is found to be sufficient to hydrolyse dextrans present in the process. It is argued that use of dextranase provides a significant cost improvement in production of sugar.

Present stage of Innovation and How it works

A plant having capacity of >20 tons for sugar season has been installed for commercial production of Dextranase

>5000 du/gm. Varuna Biocell has successfully implemented Dextranase application at 5% sugar mills in India @ 5ppm. The product has penetrated international markets having sold >15MT Dextranase equivalent to >5000 du/gm. Moreover, Varuna Biocell has successfully completed commercial trial at various sugar mills in India and abroad.

Further Developmental Possibilities

Varuna Biocell is also pursuing application of dextranase on Dental Plaque removal. A clinical trial is planned at some dental clinic for plaque removal. The company is further engaged in expansion project for making 50 tons

per annual sugar season as the demand of Dextranase is increasing day by day.

How BIRAC was helpful

BIRAC has helped us in mentoring, scaling up, capacity building and providing access to information. The support of BIRAC has accelerated the development process resulting in an affordable product of national and societal relevance. BIRAC has nurtured our minds and encouraged us to pursue our scientific dreams. Varuna Biocell is thankful to BIRAC for their support and the incredible journey which company has shared working over the years. ■

Clinical Investigation of Galnobax® for the Treatment of Diabetic Foot Ulcer (DFU)

NovaLead Pharma Pvt. Ltd.

Problem

About 415 million people suffer from diabetes globally. About 15% of diabetics suffer from DFU in their lifetime, with 25% of DFUs requiring amputation. The only approved drug treatment for DFU is a biologic, with a black box warning. DFU is a serious disease with very limited drug options and high cost of treatment. India has an estimated 69.2 million diabetics. DFU adds significantly to the disease burden.

Present stage of Innovation and How the innovation works

Galnobax® is a generic cardiac drug, re-positioned for a new use in treatment of diabetic foot ulcers (DFU) with a novel topical gel formulation. The company has recently completed phase I/II clinical trial and Galnobax® shows significantly promising efficacy results and no safety concerns.

Galnobax® is expected to be working through multiple mechanisms at different stages of wound healing. As demonstrated by the clinical trial data, Galnobax® is supposed to trigger and revitalize the intrinsic wound healing processes, enabling faster and complete closure than placebo, especially for plantar wounds and wounds that did not heal for more than 12 weeks before entering the trial.



Further Developmental Possibilities

The next development of Galnobax® is expected to be a phase IIB registration trial or a phase III trial. Galnobax® could also be developed further for venous leg ulcer (VLU) and pressure ulcer (PU), which are under-served disease conditions similar to DFU.

How BIRAC was helpful

BIRAC support was very useful in development of Galnobax®, from relatively early stage till date. Besides the vital financial assistance, we received a lot of encouragement and guidance from all BIRAC officials and field experts appointed by BIRAC. Our queries were answered promptly, the disbursements were made timely and the overall experience was very cordial. ■



Validation of Small-Molecule Target Identification Technology for its Versatility

Shantani Proteome Analytics Pvt. Ltd.

access the activity of the 'hit' compound in sub-cellular location specific manner and later captures the target of the 'hits' from these locations. Optimized work-flow allows capture of a few and rightful targets of the 'hits' and identified targets can be validated in very short period of time. Information of identified target elucidate the action mechanism of the 'hits' and thus powers the Go/No-Go decision making for the development of the 'hits' into 'leads'.

Further Developmental Possibilities

Currently Shantani's proprietary probes target three different basic compartments (Membrane, Cytoplasm and Nucleus) of a biological cell. The technology can be further evolved by developing cellular-organelle specific probes.

How BIRAC was helpful

BIRAC supported the validation of this technology platform through its SBIRI scheme. Along with the funds the suggestion and advices that the programme received from the technical committee members of BIRAC-SBIRI was very useful in developing the technology. ■

Problem

In drug discovery industry drug-like small-molecule 'hits' identified through phenotypic screening faces tough development challenge because their protein targets are not known and mechanism of action remain elusive. Available technologies provide limited information and cannot power Go/No-Go decision making.

Present stage of Innovation and How the innovation works

Technology developed by Shantani is now a fully commercial technology platform. The technology relies on proprietary sub-cellular location specific chemical-biology probes developed by Shantani. These probes

Confined Field Trials and Biosafety Studies on Genetically Engineered *Brassica juncea*

Mother Dairy Fruit & Vegetable Pvt Ltd.

Problem

At present more than half of edible oil requirements of the country is being met through imports. During 2014-15, edible oil imports were worth about Rs. 65,000 crore. Present productivity of mustard is very low (around 1200 kg/ha). Availability of productive mustard hybrids will help in increasing mustard seed and edible oil production.



Present stage of Innovation and How the innovation works

All the bio-safety analysis such as Biosafety Research Level trials I and II for three years, allergenicity and toxicity studies (acute and subchronic), environmental safety studies, compositional analysis etc. have been completed and a dossier has been submitted to GEAC for commercial release of hybrid DMH-11.

A modified *barnase-barstar* system has been used for pollination control and heterosis breeding in *B. juncea*. Separate male sterile and fertility restorer lines have been developed using genetic engineering techniques by inserting *barnase* and *barstar* genes derived from a commonly occurring bacterium (*Bacillus amyloliquefaciens*) to create a robust control mechanism in *B. juncea* for hybrid seed production. The male sterile and fertility restorer lines have been crossed to produce fully fertile hybrids, which have been tested in field conditions. Over 20% increase in productivity has been demonstrated in ICAR field trials.

Further Developmental Possibilities

After de-regulation of genes involved in development of DMH-11, it is proposed to develop canola quality mustard hybrid (with zero erucic acid and low glucosinolate) and high oleic mustard hybrids. Future work will include development of improved hybrids with better agronomic characteristics and resistance to biotic and abiotic stresses.

How BIRAC was helpful

The financial support from BIRAC has been instrumental in taking the innovation forward. Without this support it would not have been possible to undertake biosafety studies on mustard hybrid DMH-11 which are mandatory for the release of any transgenic material. The project has immensely benefitted from the guidance provided by the technical review/monitoring team of BIRAC in completing the biosafety studies successfully. ■

Social Innovation Lighting Lives Sustainably

Contd. from pg. 09

The other lesson was not to confuse growth with scale. Scale is too unilateral and in many ways is a very short term characteristic - if spoken from individual organizations point of view. Scale should always be viewed from an eco-system perspective - for example scaling up of a financial process etc.

What factors dose one needs to take into account for scaling social innovations and making them sustainable? How can one create a link to the grassroots such that one understands the regional & local context? What models did you experiment to scale SELCO? Please let us know a few examples.

HH : I am a bit skeptical on the present definition of scale. And is mostly spoken by persons who have not gone through the grind of setting up an enterprise. When catering to the social needs of the society many factors come in play - local context, needs, asset creating opportunities, payment mechanism, local market linkages. Each one is a process and each process has a step. So either steps can be replicated or processes can be. So it depends on the context.

Incubators play an important role in nesting and nurturing entrepreneurs and risk takers? What are your

thoughts on taking the incubators to communities especially rural communities?

HH : Agreed but rather than taking incubators to the communities should we not look at getting and inspiring entrepreneurs from the communities themselves. One needs to start creating inclusive incubators.

What policy changes would you like to see being implemented for boosting entrepreneurship especially technology led social innovation?

HH : There has to be a culture of risk taking. There has to be an innovation fund which can take risks (say 90% failure). Policies should encourage more enterprises in this sector to take risk and innovate. Tax structures have to be modified to encourage such enterprises.

Any advice that you would like to provide to our entrepreneurs especially social entrepreneurs who have just begun their journeys.

HH : Stick to learning what you want to do rather than running after raising money. Money will come but first learn the ground and spend some years doing it. ■

BIRAC-CDSA Regulatory Workshop Series in South India

Demystifying Indian Drug Regulations for New Drug Approvals

Biotechnology Industry Research Assistance Council (BIRAC) in collaboration with Clinical Development Services Agency (CDSA) conducted a workshop on 'Demystifying Indian Drug Regulations for New Drug Approvals' on 04 September 2015 at CDSCO Bhavan, Hyderabad. The objective of the workshop was to demystify Indian drug regulations for new drug approvals and provide direct, relevant and valuable information on key aspects of new drug approvals including its regulations in India. Challenges faced, research strategy and development path for new drug were discussed in this workshop.

This workshop was attended by 55 participants from various organisations. There were 11 faculty members which included 4 Senior Regulators from CDSCO.

A handbook on regulations for New Drug Approvals was given to all the attending participants. All the presentations of this workshop was uploaded on CDSA website and shared with all the participants. This meeting offered a platform for all the participants to seek answers to various unresolved queries of theirs from different areas of new drug approvals. It provided a rare opportunity to interact on one-to-one basis with the current regulators. ■



Regulatory Requirements for Bio-pharmaceuticals – From Science to Commercialization

Biotechnology Industry Research Assistance Council (BIRAC) in collaboration with Clinical Development Services Agency (CDSA) conducted a workshop on 'Regulatory Requirements for Biopharmaceuticals – From Science to Commercialization' on 15 October 2015 at National Centre for Biological Sciences (NCBS), Bangalore.

The objective of the workshop was to provide direct, relevant and valuable information on key scientific aspects of Biopharmaceuticals including its regulations in India. This workshop focused on sharing the updates on regulatory developments and guidance documents, review approval process, real time experience in filing and seeking approval,

step-wise development process, standard format and content of IND submissions, including regulatory and scientific requirements, pre-clinical and clinical needs in the area of biopharmaceutical development. This workshop gave ample opportunity to interact with the regulators and clarify doubts through networking and Q&A sessions.

This workshop was attended by 43 participants from various organisations. There were 11 faculty members which included 3 Senior Regulators from CDSCO.

A handbook on *Regulatory Requirements for Biopharmaceuticals* was given to all the attending participants.



All the presentations were uploaded at CDSA website and shared with all the participants. This meeting offered a platform for all the participants to seek answers to various unresolved queries of theirs on biopharmaceuticals.

To summarize, this one day workshop provided an opportunity

for all stakeholders (industry, CRO, etc.) to understand in detail the entire regulatory pathway of biopharmaceuticals from its discovery till its commercialization covering all aspects of laboratory and manufacturing process. This platform provided a rare opportunity to interact on one-to-one basis with the current regulators. ■

BIRAC - IITM workshop on

Downstream Processing of Recombinant Proteins and Other Biomolecules

The primary aim of the workshop was to provide hands on training to participants from industries working in the area of bioprocess optimization, with a primary focus on recombinant systems. A total 28 participants from 22 different enterprises participated in the three day workshop. A booklet containing background information was provided to all participants in addition to handouts for conducting the experiments and data analysis. The faculty that addressed the participants included Dr (s). Guhan Jayaraman, Vijayalakshmi, Sanjay Nene, A. K. Panda, S. Ramalingam, Sivakumar Palani and K J Mukherjee. The experimental set-up involved purification of recombinant

asparaginase from fermentation broth, inclusion body processing and protein refolding of recombinant asparaginase and purification of hyaluronic acid by ATPS and diafiltration. A demonstration of different chromatographic techniques such as protein crystallization, monolith HPLC column and displacement chromatography was also given to the participants.

The participants felt that the workshop was a wonderful initiative and was not only well structured but was also conducted in a very professional manner making the time invested by all worth every moment. ■



Social Innovation in Healthcare Wellness, Online!



Sameer Sawarkar
Co Founder & CEO
Neurosynaptic Communications Pvt. Ltd.

India struggles with the challenges of both Communicable and Non-Communicable diseases (CDs & NCDs). NCDs account for nearly half of the deaths in the country. The estimated economic burden of these ailments is close to \$6.2 trillion (2012-30). CDs, maternal, antenatal and nutritional disorders constitute 40% of deaths in India.

Poor access to basic healthcare is a major cause rural of concern in India. Over 70% of India's population is rural, whereas 80% doctors and 60% hospitals are in urban areas. Quality healthcare is sought very late in the disease-cycle. Up to 80% of healthcare financing is out-of-pocket, and millions of households fall below poverty line every year due to their healthcare expenditures alone. Attempts of taking doctors to the rural areas have failed. Villagers are left to be treated by unqualified rural providers.

Telemedicine is one mechanism to bridge this healthcare gap and has been in existence for a number of years. Have you ever talked to your family doctor on the telephone? Well, that is also telemedicine!! Over the past few years, it has transformed into e-Health and m-Health, with rapid spread of Internet access and mobile connectivity, even in the tier-II and tier-III towns and cities.

For any technology to effectively address the needs of population at the bottom of the pyramid, following factors have to be kept in mind.

Affordability: Statistics show that the rural patients spend as much as 1.5 times their urban counterparts to access care for the same ailment. This is due to the expenses on travel, loss of wages, etc. If any technology based solution has to bridge the access gap for the rural population, it should be affordable for the rural population.

Accessibility: Nearest healthcare facility in the rural areas is located about 5-10 Kms away. Any proposed solution should be made available at a distance less than what the patient currently travels to meet a "Healthcare Provider".

Quality: There can be no compromise on the quality of

healthcare provided to the rural patient irrespective of any other factors. People demand, and justifiably so, good quality of care. Devices and Software should adhere to the international standards of quality or as prescribed by the local regulations in the region of operation.

Training: Any personnel, who are expected to use the innovative technologies, should not be expected to be highly qualified. With minimal training, they should be able to provide good care to the patients.

Under-medicalisation: There is a paucity of doctors in the rural areas and that need is not going to get addressed any time soon. Social Enterprises working in the healthcare industry should create solutions that depend on health workers who are already available in the region e.g. ANM, ASHA, etc. Skills of these health workers should be enhanced through the use of innovative technologies, so that they are able to address the primary healthcare needs of the population. However, just creating technology solution is not enough. It also requires policy changes at the government level to allow such personnel to provide primary care, albeit after appropriate training.

Fragmented Ecosystem: Only about 20% of the healthcare infrastructure in the country is public. Remaining is private, but majority of it is also disjointed and unorganized, especially in the semi-urban and rural areas.

Any Social Innovation looking to address the healthcare needs should bring together the providers of various services – from consultation to diagnostics to medicines to referrals. ReMeDi® solution from Neurosynaptic is an example of a Social Innovation trying to bridge the gap between the rural

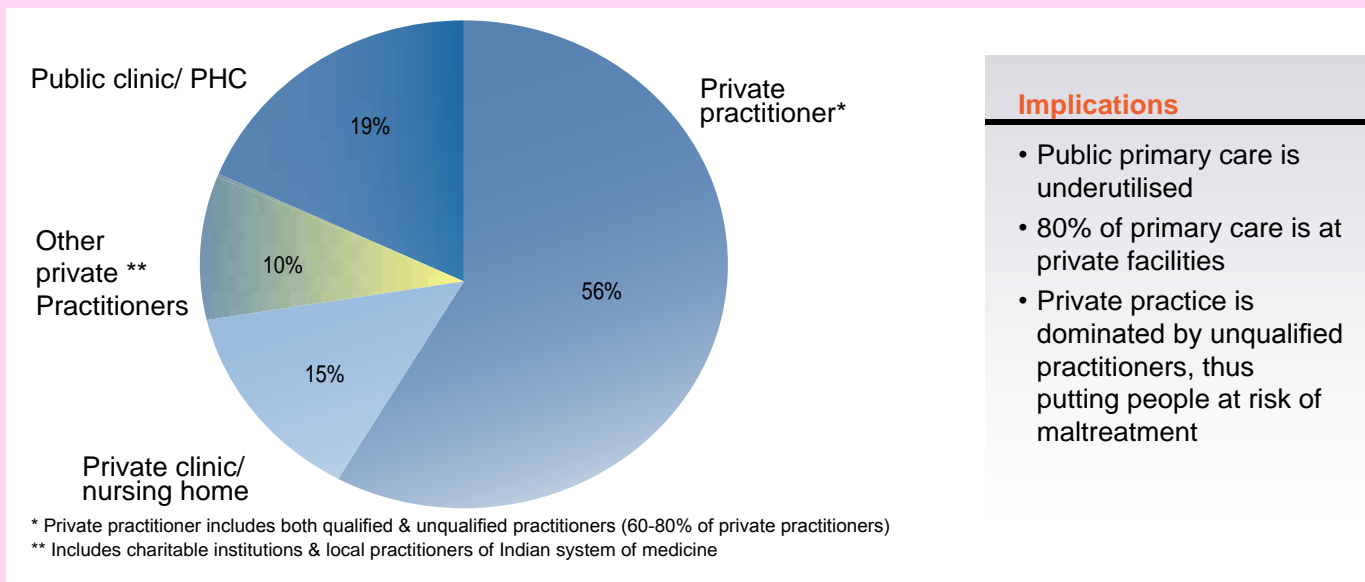
population and the urban healthcare service providers by inter-connecting various components of the healthcare ecosystem, and has been able to reach to over 5 Crore population with 2000 village health centers and over 8000 health workers, working at minimal infrastructure and bandwidth needs.

Infrastructure: Minimal infrastructure requirement for the solution.

Collaboration & Integration: Amongst technology and service delivery, among public and private sectors, alignment of funding supports for appropriate technologies and delivery, etc.

A number of Social Enterprises have been creating innovative products and technologies to address the needs of the population, who have till date been deprived of access to even the basic healthcare facilities. Some of these enterprises have created medical devices to enable health workers to carry out diagnostic tests at the point-of-care e.g. Biosense, Achira Labs, Bigtec etc. There are many others who have developed mobile applications to capture demographic and medical data for rural population e.g. PATH, D-Tree, etc. Quite a few organizations have been working in the rural areas to deliver healthcare services using technology e.g. World Health Partners, WISH Foundation, Meenakshi Mission Hospital, etc.

Last mile technology based health delivery through a well integrated ecosystem has its own challenges, which are way different from the traditional usage of telemedicine technologies in the western world. With a large pool of social innovators and a readymade platform to deploy the innovations in the market, future looks really bright for healthcare delivery in India. ■





Biotechnology Industry Research Assistance Council

(A Govt. of India Enterprise)

Under the aegis of Department of Biotechnology,
Ministry of Science & Technology
Government of India



BIG scheme encourages and supports Biotech Entrepreneurs to establish and validate proof of concept (POC) for an idea with a commercial potential

Biotechnology Industry Research Assistance Council (BIRAC), a Section 8 'Not-for-Profit Company' of Government of India, has been set up as DBT's interface agency, to serve as a single window for emerging biotech companies.

BIRAC invites proposals from

► Biotechnology start-ups/entrepreneurs

- Having a registered company incorporated on/after 1st January 2013

OR

► Academicians, Scientists, Researchers, PhDs, Medical degree holder, Biomedical Engg. Graduates

- Incubating in a Technology Business Incubator

Who have innovative technology idea with considerable potential for impact/commercialization.

SCOPE & SUPPORT

- BiG is for high level of innovation in the Biotechnology sector, BIG does not support basic research projects.
- BIG scheme supports only up-to Proof-of-Concept stage.
- Grant-in-Aid up-to ₹ 50 lakh
- Grant periods 18 months
- Mentoring support and Project Monitoring by BIG Partner.

The BIG scheme is implemented by our BIG Partners



www.ccamp.res.in <http://www.fitt-iitd.org> www.ikpknowledgepark.com <http://www.kitincubator.in/> <http://www.venturecenter.co.in>

How to Apply

Only Online submission of proposal is allowed under BIG scheme. Register on BIRAC website under "BIG User" for submission of proposal. User registrations open round the clock. Prior recipients of BIG grant are ineligible. For further details on the scheme, eligibility criteria, FAQs and registration log on to www.birac.ni.in

Important Dates	Proposal Submission Starts	Proposal Submission Closes (midnight of)
	1st January, 2016	15th February, 2016

For any queries, please contact:
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Visit our schemes at
www.birac.nic.in

Other Schemes: SBIRI • BIPP • CRS • SPARSH • BIS • UIC • DBT-BMGF

**Biotechnology Industry Research Assistance Council (BIRAC), French Embassy in India
Indo-French Centre for the Promotion of Advanced Research (CEFIPRA)**

jointly invite proposals (2nd call) on

“Red Biotechnology up to pre-commercialization stage”

15th October, 2015 -15th Jan 2016

Themes of the Call

- » Molecular diagnostic for prediction of Alzheimer's and other dementia;
- » New assisting technologies for mobility of physically challenged (including prosthesis and robotics applications)
- » Biomaterials and cell engineering for health applications

For Further information please contact Director, CEFIPRA, email: director@cefipra.org or Dr Jyoti Shukla, Manager (Technical), BIRAC email: jshukla.birac@nic.in

Biotechnology Industry Research Assistance Council (BIRAC), Bpifrance Financement (Public Investment Bank) and Indo French Centre for Promotion of Advanced Research (CEFIPRA)

jointly invite Joint Expressions of Interest (JEOI) on

“Digital Health and Individualized Medicine”

18th November 2015 – 18th February 2016

Themes of the Call

- » Digital healthcare: ehealth, Tele-monitoring, Tele-care connected health, health IT, Big data, e-patients, internet of M-health things “m-IoT”, 4Ghealth.
- » Individualized medicine: Development of therapeutic solutions for individual patients, repaired human, pharmacogenetics

For more information please contact The Director, CEFIPRA e mail: targetedprogrammeme@cefipra.org or at BIRAC to Dr. Jyoti Shukla, Manager Technical, email: jshukla.birac@nic.in or at Bpifrance to M^{me}. Ineke PETIT, International Innovation Project Developer, email: ineke.petit@bpifrance.fr

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