INTRODUCTION

The landscape of biotechnology industry in India has seen rapid changes over the last decade with the Department of Biotechnology (DBT) and BIRAC playing an anchoring role. The pioneering programs such as the BIG, SBIRI, BIPP and CRS gave a significant boost across the value chain of product development- from ideation to commercialisation.

This support from BIRAC has catalysed development of at least 100 products and technologies that combine several crucial aspects- they are innovative, high quality and affordable. These aspects amplify the impact of the products not just for India but also across the world- a crucial building block in transitioning India as a global hub for biotechnology.

The Innovator Conclave, which is in its 6th edition, has been a flagship platform for all the stakeholders in the biotech community to interact, share knowledge and explore partnerships. The conclave has evolved over the years and we have integrated aspects such as Bio-Innovation Fair and Innovation Marketplace- showcasing the products and making innovators and startups interact with important stakeholders such as investors, government officials, policy makers, trade bodies of India and other countries with the strategy that it will lead to new partnerships and help transition Indian startups to the next level.

Additionally, this year we are also showcasing models of three products- DBT -ICT and India Glycol's "Bioethanol production plant" (with 10tons/day capacity) that uses a 2nd generation technology to convert any agricultural lignocellulosic waste into sugars and ethanol, Green Power System's "BioUrja" which is a state of the art feedstock- agnostic anaerobic, zero water foot print digester which can generate 1.2 million kgs of clean LPG, and Science for Society's "Solar Conduction Dryer" for dehydration of agri products that reduces wastages of agricultural products by augmenting proper storage.

The BIRAC Bio-Innovation Fair has brought together 65 products and technologies by our startups and SMEs who are demonstrating their impact through live demonstrations, posters and direct interaction with the public. These products range from cutting edge medtech products for detection of diagnosis of chronic and infectious diseases, drugs and vaccines for reducing the burden of diseases, industrial biotechnology for improved processes for manufacturing and agricultural products for increasing productivity.

The 'Exhibitor Book' captures the salient aspects of the products and technologies being showcased and we hope this will catalyse productive conversations, collaborations for greater good of the society- nationally and globally.

DEVICES & DIAGNOSTICS

Achira Labs

ACHIRA

ACIX 100

Brief description of the innovation

Achira Labs has developed a novel diagnostic system by translating its cutting-edge micro and nanoscale technologies. ACIX 100, a table-top instrument, capable of performing and analyzing microfluidics based immunoassays have successfully demonstrated their potential by matching all set standards in the market.

Novelty (Unique features) of the product/technology

This innovation is a fast, accurate, reliable and cost-effective solution to improve healthcare standards of all; especially in remote and resource limited settings. The technology can perform multiplexing, i.e. can test an array of proteins simultaneously from same volume of sample. It has the further advantage of faster turnaround time, lesser volume requirement (finger-prick blood vs venous blood). We have also utilized cloud based technology for better delivery of health care data.

Unmet need in the product/technology, societal relevance

Microfluids based immunoassays technology has limited presence in resource limited settings.

Market Potential & Competition

Compact instrument validated to meet market expectations along with several other benefits like low cost, easy maintenance, user-friendliness etc provide Achira the uniqueness in the market.

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Accuster Technologies

Mobile Lab

Brief Description of the product

Mobile Lab is a Compact Portable Clinical Laboratory in a suitcase having Power Back-Up. It consists of all essential instruments like Biochemistry Analyzer, Centrifuge, Incubator, Data Recorder/Mini Laptop with Patient Data Management Software, Micropipettes and other accessories.

Novelty (Unique features) of the product/technology

Mobile Lab is rugged and can be easily carried to far flung and remote locations. Suitcase has Omni-directional mobility.

Unmet need in the product/technology, societal relevance

The Product has been designed to make diagnostics available to unprivileged society who does not focus on their health and to reach areas where electricity has not yet reached. The success of this project will have greatest impact on NCD which is a cause of 58 lacs deaths equivalent to 37 Nuclear bombs every year. Another great social impact it can make is by empowering the village youth by providing them great livelihood model.

Market Potential & Competition

In India, we have a market of 2000 Cr and of 10000 Cr abroad. As of now, we do not have any competitors in market when it comes to Portable Lab and Labike.

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C-CAMP & IIT Madras

Microfluidics Based Flow Analyzer

Brief Description of the product

The product developed at C-CAMP and IIT-M is a miniature flow analyzer in a lab-on-chip form combining principles of optics, flow cytometry, micro fluidics device fabrication, optoelectronics, data acquisition and analysis to allow rapid cell analysis.

Novelty (Unique features) of the product/technology

Micro fluidics based Flow Analyzer for biological and non-biological applications. This device is amicable for Point-of-care Diagnostics.

Unmet need in the product/technology, societal relevance

Point-of-care device is needed in low-resource settings for Health, Agriculture, and Veterinary etc.

Market Potential & Competition

The product is miniature lab on chip platform technology for biological and non-biological application. With HIV therapy widely accessible around the world, there is a need for portable affordable immune health monitoring device. This device will have market in places like India, China, Africa and many other countries.

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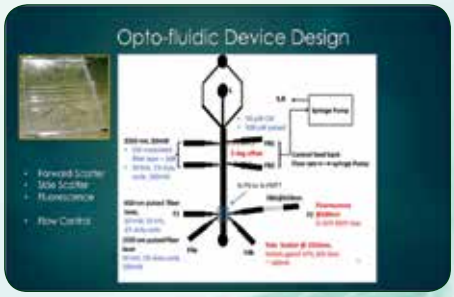

Cutting Edge Medical Devices

SCINTIGLO

Brief Description of the product

This is a smart, point of care, hand-held diagnostic device for rapid, reliable, economic and accurate quantitative estimation of urinary proteins.

Novelty (Unique features) of the product/technology

This is a battery operated, hand-held device, which performs the diagnostic test at the point of care within 2 seconds and with more than 90% accuracy and reliability. The device has an on-board bluetooth module that helps to connect the device with a Smartphone through a dedicated app. Through this, the data collected can be shared, stored and analyzed. The patient id entry on the device is Adhaar enabled.

Unmet need in the product/technology, societal relevance

There is no reliable, accurate and economic means of performing the test at the point of care and in the rural health centers. Mostly available PoC solutions are less accurate urine-dipsticks and smartphone based devices reading the available dipsticks.

Market Potential & Competition

There is a huge market potential for the device as global Point of Care diagnostics market is worth USD 23 Billion, growing at a CAGR of 9.8 to reach USD 40 Billion by 2023. of this, the PoC urinalysis market is worth USD 1.2 Billion and shall reach to USD 2 Billion, growing at a CAGR of 7.6. India, China and Brazil are the major markets. Competitor products are:

- URISTIX dipsticks by Siemens Inc.: Rs 6 -7/Strip, 64% accuracy
- MICRAL dipsticks by Roche Diagnostics Inc.: Rs. 75-80/strip, ~ 90% accuracy
- Smartphone based devices to read the existing dipsticks

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DesignInnova and ICGEB

UCP Scanner

Point of Care Diagnostics

Many countries around the world face the mounting healthcare challenges of escalating costs, anti-microbial drug resistance and patient access. The globally felt need today is for faster and affordable diagnostic tools. This includes wearable devices, sensors, remote monitoring, real time analysis and other innovative solutions that promise to improve treatment outcomes. Point-of-Care and rapid testing is cost effective indeed. However, healthcare systems need to adapt to take advantage of these possibilities and implement them wherever it makes sense.

Breakthrough

DesignInnova in partnership with ICGEB, DBT and Turku (Finland) has developed an innovative, indigenous, affordable 'plug-and-play' point-of-care platform capable of running tests from different developers.

- Robust solid-state design uses a novel up-converting phosphor technology technique as a detection system.
- Suitable for Point-of-Care diagnostics using standard lateral flow cassette format and adaptable to common diagnostic formats, ensuring an optimum design which is affordable & portable.
- Easy to handle, with features such as one minute scanning and easy readability.

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Genomix Molecular Diagnostics

Malaria Rapid Card Test

Brief Description of the product

Genomix Malaria Pf/Pv Antigen Rapid Detection Test Kit is a Lateral Flow Assay based qualitative determination of Malaria *Plasmodium Falciparum* specific histidine rich protein-2 (Pf HRP-2) and Malaria *Plasmodium Vivax* specific lactate dehydrogenase (pLDH) proteins in human whole blood specimens. These kits are validated by WHO/ FIND/CDC for their performance.

Novelty (Unique features) of the product/technology

The kit is in cassette format housed with immunochromatographic nitrocellulose membrane strip pre-coated with monoclonal antibodies specific for HRPII and pLDH on two separate lines. The malaria specific proteins in blood can be detected using specific antibodies conjugated with gold nanoparticles to detect the disease specific antigens. So, the test is designed for differential diagnosis between *Plasmodium Falciparum* and *Plasmodium Vivax*.

Unmet need in the product/technology, societal relevance

Lack of proper diagnostic tools for detection of malarial parasites at resource limited areas. Genomix malaria test kit is suitable to normal climate and can be performed at resource limited areas and addresses all the diagnostic problems to detect Malaria at point of care areas in world wide.

Market Potential & Competition

There has been a steady increase in the number of Malaria diagnostic tests performed globally (with an increase of 60% every year). Currently, the market value is estimated to be in the range of$70 to $80 million. The market share is significantly shifting towards WHO validated kits and major players like Alere and SD diagnostics are bringing the market price down. Genomix is cornering retail market niche.

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Janacare Solutions

Jana Care

DxPhone -AiNA strip reader

AINA device has been developed & commercialized to measure blood glucose, HbA1C, lipids (HDL, LDL, TrG), creatinine and haemoglobin. The device can be used in hospitals for in-patient management, for self-monitoring by patients at home and for general screening by health workers.

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Pathshodh

AnuPath: Multianalyte PoC device

Brief Description of the product

PathShodh has developed a novel technology based point-of-care medical device for management and early prevention of complications for diabetes, chronic kidney disease, anemia and malnutrition. The handheld medical device utilizes dry test strips for detection of biomarkers related to respective disease.

Novelty (Unique features) of the product/technology

PathShodh's test strips are based upon novel patented technology. Each diagnostic test has dedicated test strip as the mechanism for detection of each bio-marker is different. The test strips are not based upon enzymatic or immune-assay based process thus eliminating the need for any sample preparation, controlling the environment for testing or maintaining a cold chain. This characteristic imparts the test strip high stability and makes them very robust to changes in temperature and humidity.

Unmet need in the product/technology, societal relevance

Diabetes being a big problem in India, needs intervention at the masses level. A true point-of-care technology can reach this level. However this technology needs to be robust enough to withstand any environment and simple enough to be useable by anyone.

Market Potential & Competition

Since the technology is robust, easy and affordable, it is intended for large population and diabetes being a big problem in India, presents a big market oppurtunity. The offerings from competitors are based on conventional technologies making them complicated to use and out of reach of common man.

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Robonik India

Automated *In Vitro* Diagnostic Instruments

Brief Description of the product

FABCA, ELISTA and Autourine are common use essential instruments in medium and large laboratories. Products are designed and developed to meet harsh Indian working conditions. Most components are indigenized to increase the competitiness and reduce import dependency. The aim is exclusive & innovative sensor development to optimize the complexity.

Novelty (Unique features) of the product/technology

- FABCA Automated Chemistry Analyzers Speed: 400 tests/hour (with ISE 600 tests/hour); Input parameters: 60 samples, 48 reagents, reading chamber with 50 cuvettes, two reagent probes, one sample probe, cooling chamber, washing module, Mixer, ISE module, Barcode, LIS interface
- ELISTA strip processor, 4 Different Reagents, 96 wells or 6 plates of 16 strips, automatic tip pick up , separate probe for Reagent and sample, Programmable washer, Inbuilt reading, Automatic strip Pickup, programmable incubation/shaker
- Automatic Urine analyzer: 10 parameters, Speed: 240strips/hr. Auto strip pickup, Auto dispensing of urine samples, Barcode, LIS interface

Unmet need in the product/technology, societal relevance

Import substitution, No other Indian manufacture for ELISTA and Auto Urine.

Market Potential & Competition

FABCA, ELISTA and Auto-urine analyzer are required in all medium to large laboratories. Currently requirements are met by importing. With indigenization of all components, we have been able to develop and manufacture at competitive price. Hence both domestic and international market can be supplied by us. Having more than 35000 installations of semiautomatic analyses we have already established strong customer base. Competition is mainly from China because of their pricing.

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TestRight Nanosystems

SpectroSmart

Brief Description of the product

SpectroSmart is the world's smallest spectrophotometer which can be used for on-the-go diagnostics, water & soil testing, etc. It measures just 90g and easily fits in the pocket of your shirt. It works in the visible range and is the only device of its kind for quantification in the field.

Novelty (Unique features) of the product/technology

Existing spectrophotometers weigh more than 5 Kgs and are as big as a printer. They use a tungsten lamp, which has a life of 1800 hours and takes 20 min to stabilize upon startup. Further, these come at a price of Rs 3-4 Lakhs. SpectroSmart is a 90g pocket spectrophotometer, which uses low power LED array featuring a life of 80,000 hours, with no warm-up delay. The device costs a tenth of the conventional spectrophotometers.

Unmet need in the product/technology, societal relevance

Millions of people living in the rural and remote areas have to travel miles and wait for weeks to get their diagnostic reports. Similarly, water and soil samples have to be sent to the labs, which sometimes changes the sample composition. With SpectroSmart, mobile labs for diagnostics and water & soil can be setup in the rural and remote areas and results can be obtained in a day. There are a lot of other applications, like quality control in food, beverages and pharmaceutical industry.

Market Potential & Competition

Applications in the field of diagnostics, color testing, education and teaching purpose, food, water & soil testing renders the device an instrument of enormous potential. Total market is estimated at $10 billions. There are portable spectrophotometers available by OceanOptics which cost over Rs 3 Lakhs.

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Xcellence in Bioinnovations and Technologies

Automated *In Vitro* Diagnostic Instruments

Brief Description of the product

This indigenously developed Point of Care (PoC) device is a small, portable, battery operated instrument and provides results in a ready to use format in <4 hours as against the usual wait of 3 working days for testing antibiotic sensitivity of pathogens causing Urinary Tract Infections. No additional training or lab setup is required to run the assay.

Novelty (Uniquefeatures) of the product/technology

The device detects sensitivity to available therapeutic antibiotics in a matter of hours in place of the conventional period of days, thereby making healthcare accessible and affordable to masses in India and other resource constrained countries.

Unmet need in the product/technology, societal relevance

The developing world does not have access to many of the best medical diagnostic technologies, which were designed for air conditioned laboratories, refrigerated storage of chemicals, constant supply of calibrators and reagents, stable electrical power, highly trained personnel and rapid transportation of samples. Development of robust devices which can function efficiently in a resource limiting settings is need of the hour.

Market Potential & Competition

This PoC has a fast turnaround time (results) and will help provide appropriate and timely therapy to patients while they are still at the doctor's clinic. This ensures a huge market both in India and abroad. We hope to achieve a target of 200 installations per year for next five years bringing the number of total tests per day to >10 Lakhs per year across the country.

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Exocan Healthcare Technologies

EXOCAN

Brief Description of the product

ExoCan is developing biofluids (blood, urine, saliva) based non-expensive early cancer detection cum diagnosis kit. It is a two-step test to provide complete molecular information.

Novelty (Unique features) of the product/technology

Standalone product in this category

Unmet need in the product/technology, societal relevance

Early cancer screening is one of the major hurdles in managing cancers globally. Due to rise in number of cancer incidences in India, it is one of the biggest health burdens in India. With our technology we aim to cover both early diagnosis sector in addition to providing confirmed cancer patients complete disease diagnosis without multiple pathological/scanning reports, and frequent travel to hospitals.

Market Potential & Competition

The total cancer diagnosis market is reaching to 15 Billion USD by 2020. Our technology is eligible to cover the whole spectrum of next generation diagnosis, *in vitro* diagnostics, molecular diagnostics etc. in oncology. There are a few foreign companies making products in similar category.

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Vijay Panchanadikar

System for Accurate Guide-wire Positioning in Orthopedic Surgery

Brief Description of the product

We propose to provide a solution to the problem of accurate guide wire positioning in fracture surgery which suffers from draw backs of trial and error. It is a free hand technique as there is no tool to steady the guide wire. We propose to deliver a system comprising of various jigs and compatible software on various bones both in 2D and 3D formats. It will reduce time of anesthesia and surgery and reduce hazardous radiation exposure.

Novelty (Unique features) of the product/technology

Consists of Software and jigs. Software predicts the future position of guide wire in C-arm X-ray image intra operatively. The software detects the jig and extends the directions of multiple parallel holes of jig onto the image of bone both in 2D and 3D. This enables operator to choose most appropriate option to drill in the guide wire. Software enables intra-operative templating of implants/bones in 2D and 3D.

Our solution is a cutting edge technology developed indigenously and protected by patent/copyright. It has high potential for export and fits in with the vision of “Make in India”.

Unmet need in the product/technology, societal relevance

As of now, guide-wire positioning is done under C arm image control, which shows only one plane at a time. It needs to be rotated to see second plane (basically a 2D visualization). This leads to much trial and error. The unmet need is to avoid this trial and error and related complications and problems. Trial and error reduces accuracy of implant positioning, leads to revision surgeries at times, results in unnecessary loss of bone, wastes precious surgery and anaesthesia time, leads to increased exposure to hazardous X-ray radiation.

Market Potential & Competition

In the UK, 117000 hip fractures were done in 2016. Hip fractures are expected to rise from 1.7m in 1990 to 6.3m in 2050 globally. All other fracture surgeries will also benefit from the system. There is no comparative product on image processing, but Stryker's system comes closest.

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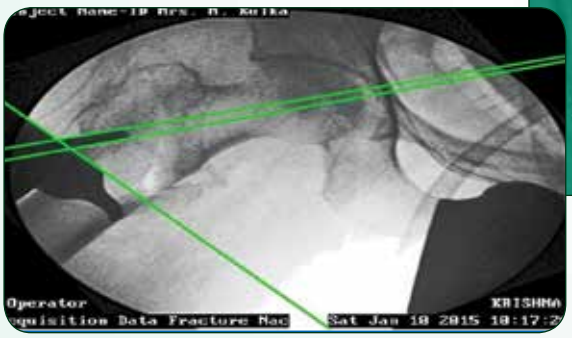


AlgoSurg

3D Surgery Planning Software

Brief Description of the product

XPSI (X-ray based Patient Specific Instrument) is a 3D printable patient specific instrument for accurate, time-saving and cost effective knee replacement surgery, all using only two X-ray images of patient's knee.

Novelty (Unique features) of the product/technology

Our XPSI technology uses only two low-cost, easily available X-ray images and automatically designs the PSI which can be 3D printed with biocompatible material. Our product also comes with surgery simulation software to choose accurate implant and take accurate clinical decisions.

Unmet need in the product/technology, societal relevance

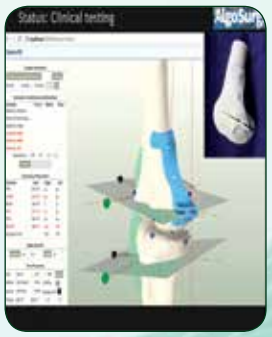
Patient specific instrument PSI for orthopedic surgery gives better outcome in surgery. However, it needs costly CT and MRI scans which may not be available at many places. We invented this technology to develop PSI using only low X-ray images. This is possible due to our XrayTo3D technology which converts 2D X-ray images of patients knee into 3D model like in CT scan .

Market Potential & Competition

India has more than 2,00,000 new patients undergoing knee replacement every year.

USA has 7,00,000 patients every year for knee replacement. The market for knee replacement surgery is the market for our product.

Competition: Mainly, there are CT based PSI available in US market however because of CT scan its high cost and less available solution.



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DF3D Creations

Osteo3d

Brief Description of the product

The cloud based 3d printing platform of Osteo3d enables the surgeon to create 3d printable medical models online from any mobile, tablet, laptop or desktop computer.

Novelty (Unique features) of the product/technology

The software automatically generates a high quality medical model and provides the surgeon with options to cut, slice and plan the sections as per his/her surgical requirements. It also provides an automatic quote and options for online payment after which the model is fabricated and delivered.

Unmet need in the product/technology, societal relevance

The unmet need is to reduce the cost for 3d printing and increase the accuracy of surgical procedures.The product is 'Made in India'. Being an affordable solution, it is expected to be easily adopted by surgeons. Other unmet requirements are to bring down the time spent in the procedure and to increase the quality of outcome of the procedure with net incremental costs being zero.

Market Potential & Competition

5 Million USD in 4 years.

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Commercialized in the name of	Osteo3d
Date of commercial Launch	01/11/2016
Number of units sold	450+

Panacea Medical Technologies

Hexapod computer controlled patent couch for LINAC machine

Brief Description of the product

"Hexapod Robotic Controlled Patient Couch for medical LINAC Radiotherapy " is a patient couch with offset load of the patient supported by a Hexapod, such that the hexapod is always away from the radiation beam while supporting the full weight in offset mode and allowing the patient to be positioned with precision with respect to the isocentre of the treatment machine. This helps to accurately align the tumour and the therapy beam and change the position dynamically.

Novelty (Unique features) of the product/technology

The couch enables clinicians to fine-tune the patient's treatment position not only in x, y and z dimensions but also in pitch, roll and yaw. These six independent degrees of freedom enable easy repositioning of patients, which decreases treatment time and achieves maximum accuracy by reducing the treatment delivery to only cancer tissues and sparing the healthy tissues.

Unmet need in the product/technology, societal relevance

Many Radiotherapy machines in the market do not offer this precise 6D positioning of the patient with respect to the therapy beam. The ability to position in 6 degrees of freedom will result in sparing critical organs at risk which may come in the beam path.

Market Potential & Competition

This is a high technology and precise product capable of competing with similar products from the developed world. Panacea is one amongst the five companies worldwide manufacturing radiotherapy machines and the only company producing this equipment in India. The end product has competitors from countries in Europe and North America.

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Cardea Biomedical Technologies and AIIMS

ATOM -Accurate Tele-ECG On Mobile

Brief Description of the product

ATOM - 'Accurate Tele-ECG On Mobile' is deemed as one of the smallest, yet the most powerful, high definition, simultaneous, TRUE 12 lead ECG system for smartphones at a global level. The accuracy of ECG signals, highly intuitive and easy-to-use app and tonnes of features packed into this small device are some important features of the device.

Novelty (Unique features) of the product/technology

In addition to the standard ECG report, ATOM features numerous innovative features. It generates a 10 sec ECG report for all the 12 lead (for detailed analysis). It also gives a Vectorcardiogram signal for QRS axis view. The device features a proprietary Maximus algorithm to view 12 channel signal on small phones with ease. Several high end technology in ML, AR and AI are currently being tested.

Unmet need in the product/technology, societal relevance

India has created an epidemic rate of CVD, accounting for 60% of the world's cardiac diseases. The need of the hour is to have a device, so simple to use, which can monitor arrhythmia in real time without any dependency on internet and present the report to its user to take appropriate action. Cardea Lab's ATOM will cater to this need.

Market Potential & Competition

ECG on smart phones is relatively a new concept and with the advantages offered by such devices, they offer tremendous market potential not only for India but for the world at large. There are a few players who are active in this segment. But with the features, ease of use and other innovations being offered at a fraction of the price, ATOM should capture a substantial market share.

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Monitra Healthcare

Smart MCT

Brief Description of the product

Monitra Healthcare is developing solutions for detecting heart rhythm disorders at real-time for pre-emptive treatments. Our products will be used to identify heart disease, monitor cardiac activity before and after surgery/procedures, and to assess the effects of therapeutic drugs on cardiac activity.

Novelty (Unique features) of the product/technology

The SMART MCT, is a completely lead-free, wireless bio-potential sensor with built-in intelligence platform that allows detection of heart rhythm disorders in real-time. The first product is an adhesive sensor patch having no wires yet sensing multiple bio-physiological parameters for 7-days due to cutting-edge breathable materials thereby drastically improving patient-compliance and diagnostic-yield.

Unmet need in the product/technology, societal relevance

Heart disease is a leading cause of death in India. And yet, a substantial portion of these deaths is in fact preventable if identified and treated on a timely basis. Delays in arrhythmia diagnoses and treatment often result in increased morbidity, mortality, and catastrophic medical expenses.

Market Potential & Competition

The ECG telemetry market is expected to reach USD 1.25 billion by 2015. Our addressable market is about USD 1 billion in India and USD 10 billion worldwide. We are first Indian company to develop adhesive sensor patches for remote cardiac monitoring. Companies such as iRhythm, Corventis, Lifewatch, V-Patch would be our global competitors. New startups would offer some competition. Our secondary competitors are Holter monitors and event loop recorders. New personal mobile health devices such as Alivecor could provide some competition but their use case is different from our continuous 24x7 monitoring and it does not detect silent events.

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Sascan Meditech

Oral Cancer Screening Camera

Brief Description of the product

The product is a hand-held imaging device that uses trimodal imaging technology combining tissue fluorescence, absorption, and diffuse reflectance for screening and detection of oral cancers.

Novelty (Unique features) of the product/technology

The device is hand-held, affordable, non-invasive and easy to use with minimal training by health workers. It incorporates a camera to screen and capture fluorescence and diffuse reflectance images of the oral cavity on illumination with LEDs emitting at 405, 545, 575 and 610 nm. The recorded images are processed in real time to identify the optimal site for biopsy and grade cancer.

Unmet need in the product/technology, societal relevance

The large prevalence of oral cancer necessitates the availability of an accurate, quantitative, non-invasive and real time diagnostic tool for detection of the premalignant tissues in the oral cavity. The ability of the device to locate the optimal site for biopsy reduces patient trauma associated with multiple biopsies and false negatives/positives.

Market Potential & Competition

The device can be used in rural areas/villages where disease is more prevalent among the BoP population. It will also have market potential in other parts of the world as a similar product for biopsy guidance and cancer detection does not exist. Competing products such as Velscope and Identafi were unable to make their presence felt in the country owing to the high cost of ownership and consumables. Further, these products relied on visual observation of tissue reflectance and/or fluorescence, and did not incorporate a camera to record and analyse images of the suspicious lesions to detect cancer

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Periwinkle Technologies

Portable TransVaginal Digital Colposcope (TVDC)

Brief Description of the product

Trans-vaginal Digital Colposcope (TVDC) is a system that consists of a pencil camera which transfers the images and videos captured to a smartphone and a cloud-enabled smartphone app. It enables remote visual inspection with acetic acid (rVIA) of cervical cancer wherein remote experts screen the visual artefacts for diagnosis.

Novelty (Unique features) of the product/technology

The TVDC facilitates rVIA without the need for a speculum. For this, we have introduced a mechanism of repeated acetic acid application (which is needed during colposcopic examinations) such that it avoids discomfort to the patient. Also the sanitization and water-proofing of the probe is achieved using a specially designed casing. This design ensures that the cost of maintenance of the overall apparatus is low. Furthermore, the modular nature of the system is designed for reusability in other endoscopic examinations also. It reduces the cost of examination (camera + laptop + personnel) and removes the dependence on constant electric supply.

Unmet need in the product/technology, societal relevance

Traditional colposcopes require a huge budget by the screening facility. Moreover, the availability of a trained colposcopist and gynecologist to recognize true positives is not guaranteed. This results in fewer screening facilities that provide colposcopic VIA exams. Electricity supply required to operate the colposcope is also an issue in developing countries. Delays in diagnosis caused by these factors make patients turn away from the exam or abandon the multi-visit screening process. Many positives often go undetected and untreated as a result. An affordable, easy-to-use, electricity-independent, hygienic, and non-discomforting mechanism to perform VIA with the help of remote experts is needed.

Market Potential & Competition

Cervical colposcopy alone is a USD 700M market as of 2017 and expected to at least double in the next 10 years. Currently, traditional colposcopes dominate this market however handheld, mobile-enabled cameras such as the Gyroscope are now becoming available. Duke University has also developed a digital probe. Our USP is the patented rVIA mechanism, casing, and modularity of the system. This gives us the advantage of increased practical utility, decreased cost, and more market applications.

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Periwinkle Technologies

BhramarHealth: A Responsive Care Platform

Brief Description of the product

BhramarHealth is a Responsive Care Platform that can collect data from sources such as sensors/ diagnostic devices, information systems, and human interfaces to facilitate interventional actions for the caregiver “end points”. While Net4Medix, Net4Hemo, Net4HomeCare are products built with it, its APIs are also available for building custom “Care Applications”.

Novelty (Unique features) of the product/technology

Providing real-time access to data from relevant channels in one place for designated caregivers enables diagnostic support and timely intervention. Our IoMT platform APIs and products give this access to the care providers trusted by the patient. This facilitates responsive care and prevents loss caused by delays in treatment or by mistreatment due to lack of information.

Unmet need in the product/technology, societal relevance

Certain health parameters of patients with chronic ailments and birth defects have to be supervised regularly. In the absence of supervised care and timely intervention, irregularities can very quickly turn into emergencies, lifelong morbidities, or even mortalities. Social chat and video applications aren’t preferred by experts due to their unstructured and uncontrolled nature. Therefore, applications to provide a supervisory view of the patient situation with mechanisms to deliver consultation instructions are needed.

Market Potential & Competition

The responsive care platform will power supervised remote care in many developed and developing countries with applications such as Net4HomeCare / Net4Medix. While Diabetes monitoring alone was a global market of USD 11B in 2014,Geriatric care is a global market of USD 900B in 2017.Currently, there are “home health” companies which provide onsite manual supervision services using staff who coordinate with offsite medical doctors. However, their model has issues of scale due to low availability of skilled and reliable manpower. Our products and platform will help these providers by enabling supervision and regular care remotely.

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Commercialized in the name of	Net4Hemo, Net4Medix
Date of commercial Launch	April, 2017 (current version of platform) January, 2015 (beta version of platform)
Number of units sold	Paying Customers: 3 businesses
Number of end users	650 (current version) 3500 (beta version)

IIT Gandhinagar & Arogya MedTech

MindEye

Brief Description of the product

A portable, low-cost, low-resource device for early dementia diagnosis and follow-up monitoring.

Novelty (Unique features) of the product/technology

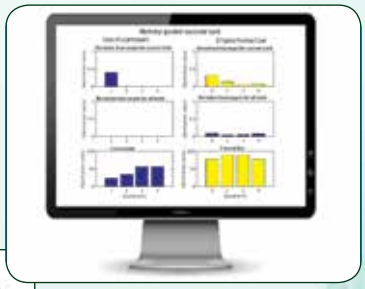
- MindEye can detect minute ocular movements and quantify pro-saccade, anti-saccade and memory-guided tasks proven for dementia prediction.
- It utilizes Artificial Intelligence tools to map the measured gaze-related indices to the possible dementia complementary tool for clinician.
- Integrated with the tele-monitoring platform

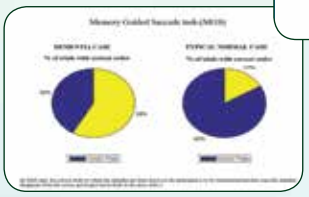
Unmet need in the product/technology, societal relevance

There is 1 case of dementia in every 16 household and the number is expected to double by 2020 and triple by 2050. Current method of diagnosis is paper-and-pencil-task, which is time consuming, does not test real life function ecological validity and require well trained psychologists and neurologists. India has low doctor:patient ratio, which is a major bottleneck in dementia care.

Market Potential & Competition

Global Market for MindEye is $16.7 Billion in 2016 with a CAGR of 8.5. MindEye will be a disruptive technology for this market.





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Terra Blue Exploration

TJay

Brief Description of the product

TerraBlue XT's flagship product TJay, currently in clinical trial stage, is the first of its kind holistic management solution for epilepsy in the world. It consists of a wearable and an app for people with epilepsy (PWE) and a powerful analytic platform for doctors and healthcare professionals.

Novelty (Unique features) of the product/technology

Our uniqueness lies in helping people suffering from epilepsy lead a healthy and safer life. We help people track health scientifically, enabling early detection of disorders and thus timely intervention, help different stakeholders understand efficacy of drugs and other intervention programs, allow faster communication between doctors and patients, and overall provide insights on health areas that require further investigations.

Unmet need in the product/technology, societal relevance

High prevalence of the disorder, huge treatment gap, high cost of treatment and economic burden on the state, less number of specialists and poor life quality of persons with epilepsy.

Market Potential & Competition

Globally the medical wearable device market size is 51.6 billion. In India the size is around 12.14 billion. There are devices in the global market to diagonise epilepsy but no predictive technology has been explored. We seek to be a leader in building non-invasive, fully automated wearable system for quantitative assessment of the Autonomic Nervous System (ANS) and improvement of autonomic balance (sympathetic and parasympathetic).

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JC OrthoHeal

FlexiOH

Brief Description of the product

FlexiOH is designed for patients having fracture/sprain who are looking for comfortable casts. FlexiOH is a cast that is breathable, washable and lightweight unlike conventional casts (Plaster of Paris or Glass Fiber cast). FlexiOH gives ultimate comfort while being enough rigid to immobilize bones or joints like conventional casts.

Novelty (Unique features) of the product/technology

- Absolute Washability: Made up of washable material, patient can wash cast & maintain better skin hygiene.
- Breathability: Holes throughout surface providing air circulation to skin. This allows evaporation of moisture and perspiration hence skin dryness is maintained.
- Light weight: Unlike POP cast, FlexiOH is very light i.e. short arm cast weights < 300 grams
- Zipper system allows hassle free application and removal without specialized cutting tools. There are few evidences of iatrogenic injury while removing conventional cast. Chances of such injuries can be hugely reduced as FlexiOH can be removed without using cast saw.

Unmet need in the product/technology, societal relevance

Imported medical technology is unaffordable and to provide affordable medical technology in Indian market is need of the hour. Our vision is to develop at least 5 new orthopedic technologies by 2020 and generate 200 direct employments.

Market Potential & Competition

Currently we have completed designing and testing of short arm cast which is addressing a market of 1.4 M fractures in India every year. We have projected 25% market coverage in India by 2020. Apart from Indian market, we are considering USA, Canada, Europe, Brazil, Australia, and UAE as future markets for FlexiOH. Competitor products include Plaster of Paris Cast, Glass Fiber Cast and HM Cast.

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PSPR 3D Prosthetic Technologies

Affordable, Innovative and Customized Below-knee Prostheses using 3D Printing Technologies

Brief Description of the product

PSPR-3D-Tech is engaged in development of technology and manufacturing of affordable below-knee prosthesis innovative reverse engineering and 3D printing technologies enabling high level fit for greater comfort and strength.

Novelty (Unique features) of the product/technology

• Affordable cost (<30,000 INR) • Excellent strength and durability achieved through innovative materials • High comfort and user friendly • Made in India

Unmet need in the product/technology, societal relevance

Most of the below knee amputees in India, particularly in trauma cases, do not show interest in getting prosthesis due to the cost barrier. Those opting for low cost/donated prostheses forgo use because of the discomfort, pain and/or physical damage to the prostheses. Thus the amputee loses quality social life and the post-amputation lifestyle is rendered miserable in comparison to pre-amputation lifestyle.

Market Potential & Competition

The market potential for lower limb prostheses (including both transtibial and transfemoral) by 2020 is:

- Global: US $2.5 billion • India: US $2 million

Reference: BRIC Orthopedic Prosthetics Market Outlook to 2020

Competitors: BMVSS Jaipur foot, Ottobock, Endolite, Ossur, Alimco

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Aarna Biomedical Products

Poorti kit: Post-mastectomy Breast Prosthetics

Brief Description of the product

The product is an affordable and holistic post-mastectomy kit to restore confidence, dignity and femininity of breast cancer survivors. Additionally, a one minute instruction video has been developed to assist the patients to use the product on their own thereby dispensing the requirement of any trained personnel. The kit comprises of one external pre-made light weight silicone medical grade CE certified material breast prosthesis available in different sizes and shapes as per the choice of patient, two pocketed brassieres available in different sizes and colors, two prosthesis covers, one prosthesis holder, information & usage manual and an outer waterproof kit which accommodates all the aforementioned components discreetly.

Novelty (Unique features) of the product/technology

We are first in the world to develop a complete solution for catering to the post-mastectomy needs of the breast cancer survivors. Our holistic innovation provides both the accessories and a compatible prosthesis as a single product. Additionally we are the sole manufacturer of medical grade silicone breast prosthesis in India.

Unmet need in the product/technology, societal relevance

Even though India is referred to mastectomy capital of the world still no significant attempt has been made to manufacture affordable silicone breast prosthesis in India and in other developing countries till date. Owing to high cost of imported ones, it caters to small percentage of population with no after sales support.

Market Potential & Competition

Breast cancer is the top most common cancer affecting women all over the world with 16,71,000 new cases being reported per year globally and India harbors approximately 10% of this global disease burden with 1,50,000 being added to the list of existing patients every year (Globocan, 2012).

Apart from domestic market, there are many Asian and African countries that do not manufacture medical grade silicone prosthesis yet suffer from huge disease burden of breast cancer.

To the best of our knowledge, there is no other medical grade silicone breast prosthesis manufacturer in India. Currently, market demand is served by imported prosthesis which are very costly and are not easily accessible.

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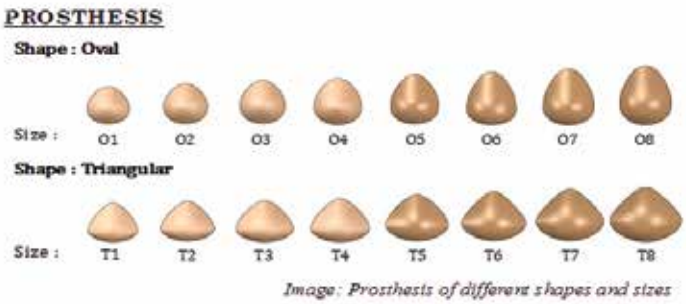

Image : Prosthesis of different shapes and sizes

Pradin Technologies

pradin technologies

FetalMom

Brief Description of the product

Fetal Electrocardiogram and Uterine Activity signal extraction from maternal electrocardiogram eliminating the need for the use of conventional transducers by acquisition of transabdominal ECG to separate fetal ECG and uterine contractions by a novel method.

Novelty (Unique features) of the product/technology

Computation of fetal heart rate and uterine contractions without ultrasound and pressure transducers

Unmet need in the product/technology, societal relevance

Available fetal monitoring devices in the market are complex, expensive & overloaded with non-essential features. The penetration is very poor. A user friendly 3-channel Electrocardiograph device with essential features at a great price will challenge the established trend.

Market Potential & Competition

This project will simplify vital signs monitoring of FHR, Uterine activity UA or Electrohysterogram EHG , fECG & mECG by just using a single maternal ECG cable strapped to abdomen & acquiring clean low noise abdominal signals to enable separation & extraction of all other embedded signals. The processed FHR & EHG can be graphically plotted on a strip chart also. This is a new technology in the market. The nearest to technical specifications is AN-24 device from Monica Healthcare from the UK.

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Sohum Innovation Labs

SOHUM newborn hearing screener

Brief Description of the product

Sohum Innovation labs has developed a gold standard ABR technology to conduct Newborn Hearing Screening. Sohum uses brainstem evoked response audiometry BERA, the gold standard technology with high sensitivity and specificity in an innovative way with an easy-to-use interface to meet needs of the system.

Novelty (Unique features) of the product/technology

Sohum provides the following innovative features:

- Unique algorithm: provides high sensitivity and specificity, Sensitivity= 98.25 Specificity= 90. We are developing the software as per ISO 62304 guidelines.
- Selective artifact rejection: eliminates use of sedatives and enables use in noisy environments.
- Optimized design: reduces test duration by reducing time for preparation & analysis which makes it ideal for mass screening.
- Reusable, easy to clean electrode system: reduces cost of the procedure.
- Telemedicine & centralized data: The telemedicine module sends selected data true positive to centralized server for recheck and keeps a track of babies screened through Sohum device for further intervention and for epidemiological research.
- Innovative business model: a unique service based revenue sharing model

Unmet need in the product/technology, societal relevance

In resource constrained settings, such as India, hearing impairment goes undiagnosed till the child is about 4 years. This leads to speech loss, impaired communication skills, possible mental illness, and unemployment. Sohum provides early screening that allows timely treatment and rehabilitation, as well as savings in health care expenses to the system.

Market Potential & Competition

Our solution reaches out to both institutional and non-institutional births, by involving the right stakeholders. The product will serve the market of 20000 pediatricians, 17000 ENT and 40000 maternity and child care institutes private and government. Besides India, 40 low income and 53 low middle income countries do not have an affordable solution for early screening of hearing impairment.

The key players in this area are Algo3i Natus, Medulla Labatsia, MB11 Maico, Madscreen otometrics, Aurix Vivasonic. They work through distributors in India.

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Windmill Health Technologies

NeoBreathe™

Brief Description of the product

NeoBreathe™ is the world's first foot operated newborn resuscitator which brings together everything needed to save the life of an asphyxiated newborn - robust, easy to use product.

Novelty (Unique features) of the product/technology

The novelty of this product lies in its being 2 handed mask holding, real time pressure monitoring, enhanced pressure safety, PEEP, built-in suction, oxygen regulation, reusability and autoclavability.

Unmet need in the product/technology, societal relevance

Every year 8 lack babies die globally due to birth asphyxia. Almost all of them can be saved through resuscitation. Resuscitation with current devices is difficult to perform - leading to preventable death and disability. NeoBreathe™ makes it easy to perform effective resuscitation - thus helping save lives.

Market Potential & Competition

Within India and globally, there is a potential in both private and public sectors. Its market partially overlaps with the market segments for Ambu-bag and T-piece resuscitator.

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Commercialized in the name of	NeoBreathe™
Date of commercial Launch	03/12/2016
Number of units sold	~ 50
Number of end users	~ 100

Sensivision Health Technologies

System to diagnose, treat and prognosticate Hypoxic Ischemic Encephalopathy (HIE) in Neonates

Brief Description of the product

Our device solution will be the first of its kind complete system to diagnose, treat and prognosticate Hypoxic Ischemic Encephalopathy (HIE) in Neonates. This device brings to market an effective and accessible solution to address the high number of mortality and morbidity associated with HIE. The device while complying with all the global safety standards is tailored for use in as diverse situations as inside an Ambulance to inside a Neonatal Intensive Care Unit (NICU).

Novelty (Unique features) of the product/technology

Unique features of the product are as follows:

- Servo-Controlled, for maximum effectiveness with temperature control at least within +/- 0.5°C
- Fully Automated, for precise treatment while reducing the need for constant clinical attention and monitoring.
- Cerebral Function Monitoring enabled, for early Diagnosis of the condition and continuous monitoring of the Treatment.
- Transport enabled, providing Portability to treat during transport in an Ambulance.
- Battery backup, enables use in low resource setting or during power interruptions.
- Whole Body Cooling made possible by finely fabricated Body Wrap providing effective heat extraction.

Unmet need in the product/technology, societal relevance

The current solutions to treat Hypoxic Ischemic Encephalopathy specifically lack on many fronts, such as:

- Unavailability of an Effective solution.
- Timely diagnosis is challenging
- Inability to treat during transport
- Nurse Intensive treatment
- Available solutions are exorbitantly expensive

Market Potential & Competition

Our immediate target market is Hospitals with NICUs, Maternal Clinics in Tier II and Tier III cities as well as Neonatal Ambulance network. Our consumable sales will be on a per patient basis and the market for which is around 6 Lakh Newborns every year. Currently there is only one UK based product available globally to treat HIE in a servo-controlled mode. None tailored for Indian needs. The device that is available in the global market is extremely expensive even by global standards.

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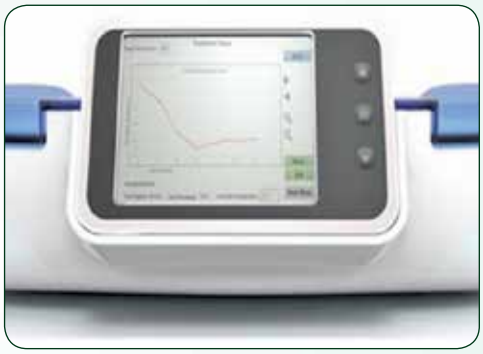

Forus Health

ShishuNethra

Brief Description of the product

The product is a low cost wide field eye-screening device for premature and term infants, the first of its kind in the Indian market. It includes a device and software infrastructure to allow for advanced post-processing, automated diagnostic tools, and remote diagnosis capabilities.

Novelty (Unique features) of the product/technology

The device is a contact fundus camera that is light-weight and portable. A novel optical system is designed to achieve both high resolution and wide field of view to enable a quick scan of infant eyes. Secure tele-medicine module that allows a centrally located clinician to remotely view and diagnose images acquired by mobile devices moving in a geographically dispersed area.

Unmet need in the product/technology, societal relevance

This product is addressing a major need for an affordable, easy to use, hand held, light weight contact fundus camera that allows for remote diagnosis.

Market Potential & Competition

There is growing awareness about prevalence of ROP. NRHM has started to implement screening programs across the country. RetCAM from Clarity Medical, U.S.A has been the sole provider of contact digital fundus imaging for many years. A lower cost imaging device will alter this scenario by making it possible for more hospitals to implement digital ROP screening programs. There is also international demand for such a device, even in places like USA and Europe, if it is made light weight and is user friendly. The traditional method is for the clinician to manually use binocular indirect ophthalmoscopy.

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Adiuvo Diagnostics

Skinscope

Brief Description of the product

Wound assessment and management is very crucial with the rise in Skin and soft tissue Infections (SSTI). We are developing a portable non-invasive device 'Skinscope', which can non-invasively detect and monitor any SSTI ranging from diabetic foot ulcer, burns, Pressure ulcers, surgical sites infections etc. within 2 minutes, aiding doctors by providing information on colonizing pathogen, pathogenic load and wound closure rate.

Novelty (Unique features) of the product/technology

• Realtime monitoring of pathogens colonizing the SSTI. • Non-invasive reagent-less detection • Remote monitoring of patients in low resource settings • Aids in right treatment protocol at an early stage • Amputation preventable

Unmet need in the product/technology, societal relevance

The Skinscope will help in early detection of SSTI development, wil provide right treatment/antibiotic protocol, reagent-less detection, enhace quality of life by preventing amputation. Commercially available dermascopes and other wound management devices do not provide information catering to the Indian Population SSTI and are expensive (800$).

Market Potential & Competition

Though there are commercially available dermascopes,VeosDermascope, Dermilite, woods lamp etc. and other wound management devices, the estimated total wound care market 1B$ USD with a CAGR 5%. In India, our device can be deployed in 25000 PHCs, 40000 General Physicians and private clinics, 7000 dermatologists, 8000 surgeons, diabetic foot center clinics, Podiatrists.

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Coeo Labs

VAPCare

Brief Description of the product

VAPCare is a novel secretion and oral hygiene management system to reduce the risk of acquiring Ventilator Associated Pneumonia (VAP). It is a holistic system that provides targeted suctioning of the secretions in order to reduce the risk factors for development of VAP in intubated ICU patients. This system eliminates the need for constant human interaction between caregiver and patient to prevent the chances of cross infection.

Novelty (Unique features) of the product/technology

- Patented Sensor based secretion management technology
- Automated lavage, by sprinkling and removal of disinfectant solution in the oral cavity, to maintain oral hygiene
- Suction tube blockage detection and clearance
- User defined setting of suction pressure and suction frequency

Unmet need in the product/technology, societal relevance

Ventilator Associated Pneumonia (VAP) is one of the most common and most critical hospital acquired infections in the ICU. In India, more than 600,000 patients acquire VAP and unfortunately more than 250,000 succumb to this infection annually.

Market Potential & Competition

Our market is nearly 50,000 ICU beds with a ventilator, in India. Ideally, each ventilated bed should have a VAPCare device for secretion management. There will be more than 19 lakh long-term ventilated patients who will need secretion and oral hygiene management. VAP Care is a patented novel technology, the current standard of care in India is manual secretion management by caregivers.

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Jeevtronics

Hand-Cranked Defibrillator

Brief Description of the product

We have developed the world's first dual powered electricity and hand cranked defibrillator that would be useful in regions without reliable electricity such as in India, Africa, S America, Asia etc. PHC/ CHCs, Army, Security forces, ambulances, etc. would benefit from this immensely. Price of the device would be 1/4th of the big brands but the device would have similar or better quality, reliability levels.

- CE marking expected in Dec 2017
- 4 Patents (1 granted US patent, 2 PCTs filed, 1 Design patent) and more in the process.

Novelty (Unique features) of the product/technology

India's death rate due to sudden cardiac arrest is 3 to 4 times that of developed countries and number of defibrillators available is low. Every year about 7 lakh people in India die of sudden cardiac arrest (SCA). Within India alone, 146,000 PHC+CHC+SC do not have defibrillators. Lakhs of ambulances in India do not have defibrillators. Hospitals (Rural, urban), government, private, Indian railways, armed forces, schools, colleges, sports arenas, government offices, factories etc. can benefit from this device. Similarly, all developing countries in Africa, Asia, and S. America do not have enough of these devices.

Unmet need in the product/technology, societal relevance

A defibrillator which can work in areas without electricity, during load shedding or power cuts is the unmet need in this technology. It is popularly known in India that except the metro cities, whole of India has "load shedding". This is the world's first defibrillator which works, both, on grid electricity and hand cranked generator. It can be charged up fully to deliver a bi-phasic shock within 7 to 15 seconds. It is battery-less, hence more reliable. It has strong reusable steel paddles and thus need no replacement parts for decades. This is ideal for areas without electricity and for ambulances.

Market Potential & Competition

Total external defibrillator market globally is about USD 2.2 Billion and growing at about 7%. Hand cranked defibrillators do not presently exist in the market. Our device is patented. However, electricity based traditional defibrillators do exist. Manufacturers included Philips, Zoll, Nihon Koden, BPL etc.

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Genrich Membranes

Oxygen Enrichment Unit (OEU)

Brief Description of the product

Innovative, affordable and accessible oxygen enriched air unit (OEU) based on hollow-fiber membrane technology for oxygen therapy. The therapy is as important as pills for the patients suffering from chronic lung diseases (COPD, Asthma) and pre-term babies with respiratory distress syndrome. Our energy efficient unit requires minimum maintenance, provides 27-35% oxygen enriched air.

Novelty (Unique features) of the product/technology

Indigenously developed HF-membrane based OEU enriches oxygen percentage from 20.8% to ~35 % at ambient temperature, requires less energy, is aimed to be a cost effective solution compared to the established techniques. Innovation: Use of HF-membranes for enriching air with oxygen from the atmosphere in energy efficient way. These small-sized units are handy, easily transportable and are customized for single patient use (small clinics, homecare).

Unmet need in the product/technology, societal relevance

Currently oxygen therapy (supplemental 27-35% oxygen) is out-of-reach for majority of the patients and considered as luxury in India and other developing countries. Thus, there exists a clear unmet need for providing affordable and accessible oxygen therapy.

Market Potential & Competition

In India, 34 million patients suffer from COPD and & 28 million from asthma; pre-term birth rate is 3.4 million/annum. Out of this total patient population, assuming 25 million patients buy Genrich's OEU (costing USD 650/Unit), translates into a market potential of USD 16,000 Million. South East Asia has 75 million patients with chronic lung diseases.In next 5 years, we aim to enter this market accounting to TAM USD 40,000 Million. There is no direct competition since membrane based oxygen concentrators are unavailable globally. Indirect competitor is cryogenic plants and PSA-based concentrators.

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Lattice Innovations

Networked critical care monitoring system for low resource settings

Brief Description of the product

Lattice Innovations is developing a networked patient monitoring system that can be used in low resource settings. The objective is to be able to relay vital patient information to offsite, remote specialists who can provide necessary treatment advice.

Novelty (Unique features) of the product/technology

The product is designed to be portable and plug-and-play, and can be easily installed in various settings, ranging from small hospitals/clinics, ambulances and even at home for post-discharge or post-surgical monitoring. This facilitates rapid and seamless transmission of clinical data to the remote specialist allowing him/her to take the right clinical decisions via low cost video consultation solution.

Unmet need in the product/technology, societal relevance

Efficient patient management through the use of wireless technology will help in reducing the rising healthcare burden which now affects many developed and developing countries, as large elderly populations who have increased life expectancy further add to the global patient pool.

Market Potential & Competition

The addition of new medical facilities provides significant opportunities for growth in the patient monitoring devices market in India, which GBI says is expected to grow from a value of $85 million in 2012 to $134 million in 2019, at a compound annual growth rate of 7%. At present, tele ICU solutions are offered only by large multinational device manufacturers, such as GE and Philips which are expensive & designed to work with devices offered by the same company.

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Alfa Corpuscles

Single-use safety syringe

Brief Description of the product

Safety Syringe developed by Alfa Corpuscles is available in various sizes, is low cost, spatter proof, and offers controlled needle retraction after injection without any intervention from the user, rendering the syringe disabled. Besides clinical use, this is also available for Prefilled Drugs and Vaccines with reduced cold chain burden.

Novelty (Unique features) of the product/technology

• Unique 4 part design • No chance of reuse or needlestick injury • Low cost of production • Useable for hypodermic injection and phlebotomy • No training required, no active user intervention required • controlled needle retraction • Available in various nominal capacities • Variants available: • Clinical safety syringe • RTFS for pre filled syringes • Cartridge load for vaccine delivery reduces cold chain burden • Compliant to all ISO Standards on Disposable Syringes and Pre Filled Syringes

Unmet need in the product/technology, societal relevance

Unsafe injections lead to transmission of infections and 1.3 million early deaths (one death every 24 seconds) annually. Injection safety represents a cost effective intervention as 87% of needlestick injuries are preventable by safety syringes.

Market Potential & Competition

Annual Syringe Consumption is 40 billion with only a handful of Safety Technologies available. The Prefilled Syringes market is around 5 Billion units annually, growing at CAGR12.8%. Injection Safety Project by WHO has been adopted by Indiawith a mandate of replacing Normal Syringes by Safety Syringes by 2020.

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Yostra Labs

Sparsha

Brief Description of the product

'Sparsha' is a medical device used for the diagnosis of Diabetic Peripheral Neuropathy, a nerve damage caused by diabetes. 'Sparshâ' can perform Tactile Threshold Test, Vibration Perception Threshold Test, Thermal Perception Threshold Test and Infrared Thermometry. Sparsha is battery operated and can connect with a Smartphone by Bluetooth and send the diagnostic report via email.

Novelty (Unique features) of the product/technology

- Single hand held device that combines four test modules, eliminating need for 4 separate devices
- The test report provides recorded values with corresponding threshold values, thereby enabling the healthcare worker to take decision on whether to refer patient to a tertiary hospital
- The Sparsha Smartphone application guides the healthcare worker to effortlessly perform the tests thereby eliminating the need for skilled healthcare workers to perform the screening test
- The device is highly portable and is designed specifically for resource poor settings

Unmet need in the product/technology, societal relevance

Approximately 30% of the diabetic population in low- and middle-income countries suffer from Diabetic Peripheral Neuropathy. 37 million patients with DPN in 2015 will swell to 69 million patients by 2040. Conventional screening methods are manual, subjective and need trained healthcare workers to operate and interpret the results. In addition, lack of access to screening devices and high cost of screening are seen as major barriers to large-scale screening of patients. The screening setup is available only in a select few tertiary hospitals. Lack of screening has resulted in DPN cases going undetected till aggravation to diabetic foot ulcers.

We are currently developing a market viable DPN screening device called 'Sparsha' that makes screening of diabetic patients more accessible and affordable to patients of all socio-economic strata.

Market Potential & Competition

The Total Addressable Market for 'Sparsha' in India is approximately INR 1300 Crores. Our current focus is on India, followed by other South East Asian and African markets. Our customers include, primary healthcare centres, district hospitals, tertiary hospitals, diabetes screening centres, diabetes foot care clinics, private practitioners, nursing homes and mobile medical units.

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INDUSTRIAL BIOTECHNOLOGY

India Glycols & DBT-ICT Centre for Energy Biosciences

10 ton Lignocellulosic biomass/day processing plant to produce about 3000 Litre ethanol/day

Brief Description of the product

This is India's first multi feed stock continuous flow plant to convert agricultural Lignocellulosic residues such as bagasse, rice straw, wheat straw, bamboo, cotton stalk, corn stover, wood chips etc. into alcohol with optimum product yields through novel indigenous technology.

Novelty (Unique features) of the product/technology

Novel features of technology are as follows:

- Biomass to alcohol within 24 hrs
- Enzyme reuse in multiple cycles
- All process steps in rapid continuous flow mode
- Single plant for all types of Biomass i.e. agricultural waste wheat/rice straw/bagasse as well as high lignin woody biomass cotton/castor stalk
- Recycling of acid, base & Water & hence ZERO EFFLUENT
- Conversion of both C5 & C6 sugars into Alcohol
- High Conversion efficiency

Unmet need in the product/technology, societal relevance

Lignocellulosic ethanol has a huge potential to supplement gasoline used in India up to more than 20 or more. The recent compulsory mandate of blending 5% ethanol in gasoline, followed by 20% blending target by 2020, will be difficult to meet through sugar cane and grain derived ethanol. Also to reduce the green house emission effect originated by burning the rice straw agro waste in northern part of India, it is need of the hour to convert it into value added products like Ethanol.

Market Potential & Competition

At present we have achieved 3% blending of ethanol in gasoline, which is far behind the target of 5% blending. But through this technology we can achieve the mandate of 5% blending of ethanol in gasoline, which leads a direct benefit to oil manufacturing companies for blending & same can be used for manufacturing green chemicals for selling in open market which will finally yield profit in Indian economy.

This blending mandate can be raised up to 20% or higher, for this enough quantities of ethanol are not available to meet the projected requirement. With a potentially successful lignocellulosic ethanol technology, this gap can be more than bridged.

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Eram Scientific Solutions

Eram Scientific

eToilet

Brief Description of the product

eToilet, an unmanned and automated electronic toilet developed by Eram Scientific is integrated with a waste treatment technology called NEWgenerator™ developed by University of South Florida, which allows for the sustainable recovery of nutrients, energy, and water at the point of disposal. This will provide a cost effective, modular sanitation technology that is relevant to broader segments of Indian population and can be implemented even in locations with unreliable electricity and water connection.

Novelty (Unique features) of the product/technology

- Technology enabled self-sustainable sanitation models
- Self-sustained sanitation model with resource generation
- Nutrient, energy and water can be generated from human waste
- Off-grid system which does not require any external utility connections
- Unmanned, low maintenance and low OPEX system
- Remote monitoring capabilities ensuring minimum down time
- Maximum deployment possible in the target areas

Unmet need in the product/technology, societal relevance

The eToilet was integrated with a waste treatment technology, the NEWgenerator™, allowing it to sustainably recover nutrients, energy, and water at the point of disposal. Full integration of the etoilet and NEWgenerator™ allowed the combined system to be implemented in a greater variety of settings, including locations with unreliable or nonexistent electricity and water connection.

The proposed project is a strategic move to broaden the scope and applicability of eToilet technology to the whole of Indian's urban environments.

Market Potential & Competition

There is a huge challenge in terms of non-availability of resources like water, electricity, etc. to ensure reach and sustainable usage of toilets. The need for off-grid systems are on rise due to the scarcity of resources. Foreseeing this alarming gap, the integrated system will have huge market potential and commercialization possibilities especially in India and other developing countries.

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GPS Renewables

BioUrja

Brief Description of the product

BioUrja is a modular, compact and customizable biomethanation system to handle various organic wastes. Easy to use, automatic, highly efficient and low footprints are some features that have helped BioUrja achieve worldwide recognition. With MIT and WWF recognizing the innovation, world-renowned partners and multiple patents, BioUrja promises a sustainable future for waste management.

Novelty (Unique features) of the product/technology

The BioUrja has temperature control and biphasic digestion which helps with stabilizing the digester and ensure higher productivity (1.5-2 times traditional systems). The system has an automatic twin-balloon compression system for automatic gas compression and pressurized storage with exact gas production data. Automatic flaring ensures that the biogas is never vented into the atmosphere. The Bio-health checker is a stand-alone apparatus to measure active health parameters of the digester surpassing the traditional pH measurement which is a lagging indicator (1-2 week lag). Remote Monitoring System (RMS) incorporated transmits all plant data including gas generation and the 3 level safety systems.

Unmet need in the product/technology, societal relevance

Currently biomethanation technology is effective only at large/centralized scale, due to the technical capabilities required to operate the plant. This was the unmet need GPS Renewables filled with automation and RMS.

The society benefits from a clean and efficient technology, curbing the predominant resistance to local Waste Management decentralized facilities. Reduction in wet garbage accumulation and need for larger mismanaged dumping grounds are some of the advantages this technology brings to the table.

Market Potential & Competition

The technology is estimated to be USD 40 Billion in India itself. The applicability overseas brings in a much larger market size.

In the Indian scenario, the competition is based on the capacity of the said project with multiple players in the industry, majority have partnered with international technology providers. In the commercial segment (100-5000) or major competitors are Mailhem, Ashoka Bio-Green and BioTech India.

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Science for Society (S4S)

Solar Conduction Dryer (SCD)

Brief Description of the product

The S4S Solar Conduction Dryer (SCD) works on the principle of drying. The SCD is an electricity free solar powered food dehydrator that reduces moisture content in agri/ animal produce so that farmers and rural women can preserve seasonal produce up to 1 year without using any chemicals and earn additional income through the sale of dehydrated products.

Novelty (Unique features) of the product/technology

SCD has the following unique features:

• One-tenth cost of life cycle compared to conventional electrical dryers, capital cost is 2-3 times lesser than other solar dryers. • Attractive payback period of 200 days
• Maintains 45% better nutrition than open sun drying

Unmet need in the product/technology, societal relevance

India loses 66 million tons of agriculture produce as post-harvest losses. It happens because of unavailability of proper post-harvest management technique.

Market Potential & Competition

Total market available for dried fruits and vegetables is around 200 billion tonnes. If we can solve the challenge of food preservation, than we can win over this market. Our main competitors are other solar dryer manufacturing industries and other preservation technologies like cold storage and electric dryers.

Commercialized in the name of	Solar Conduction dryer
Date of commercial Launch	1st April 2014
Number of units sold	1,500
Number of end users	Estimated 15,000

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Oriental Aquamarine Biotech & National Centre for Aquatic Animal Health, Cochin University

Organic Nitrifying and Denitrifying Bioreactor for Recirculating Aquaculture Systems (RAS)

Brief Description of the product

Integrated organic nitrifying and denitrifying bioreactor for Recirculating Aquaculture Systems (RAS) with a bacterial consortium delivery system that converts:

- Ammonia and ammonium ion to nitrite
- Nitrite to nitrate
- Nitrate reduced to molecular nitrogen

Novelty (Unique features) of the product/technology

Nitrification and denitrification in same system is the novel component. Conventional systems require two reactors.

- Our bioreactor maintains optimum levels of nitrogenous compounds: NH3 0.2ppm, NO2 0.2ppm, NO3 1.16ppm
- Decrease in Vibrio concentration resulting in survival rate increase to 95%
- Operational at site within 2 - 3 days. Conventional systems require 60 days for full activation
- Reduces need for chemical disinfectants and antibiotics
- Product tailor made for customer requirements and specifications
- Available in three different salinity levels 0ppt, 15ppt, and 30ppt

Unmet need in the product/technology, societal relevance

In aquaculture, organic matter accumulation takes place from left over feed, faecal matter, and other excretory products of fish which invariably deteriorate the quality of water with enhanced output of ammonia. Current industrial practices go for regular water exchange to maintain water quality. This requires significantly large amounts of freshwater. For every ton of fish, aquaculture operations produce about 50 kg of nitrogen wastes and 10 kg of phosphorus. Though Recirculating Aquaculture Systems (RAS systems) were developed to treat and reuse the water in a closed loop in tank-based aquaculture operations, they do not address the efficiently issue of ammoniaremoval.

Market Potential & Competition

The estimated bioreactor market in India is USD 427 Million for an annual output of 4,549,607 metric tons. The other major markets are Indonesia, Vietnam, Vietnam, Bangladesh, Egypt, Thailand, Myanmar, Philippines, and South Korea. The total bioreactor market for these 9 territories is estimated at USD 1653 Million. Target Markets in Aquaculture Industry:

• Hatcheries and fingerling production • Indoor Grow-out • Maturation section
• Research organizations • Nurseries

Competitors

- Aquaculture System Technology, USA – Manufacturer
- Pentair - Catalog distributor
- Local on-site assembly with purchased components

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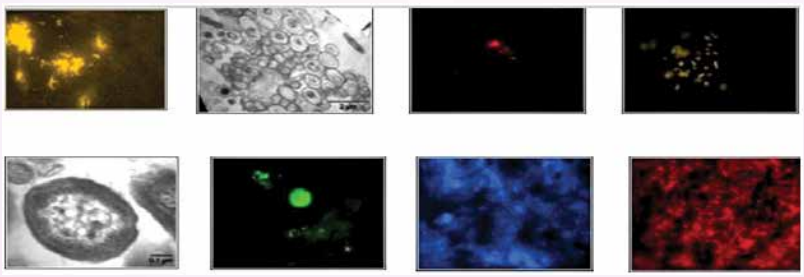
Commercialized in the name of	Bioreactor for RAS
Date of commercial Launch	21/06/2017
Number of units sold	--
Number of end users	56



Thermax

Anaerobic Membrane Bioreactor (AnMBR)

Brief Description of the product

An anaerobic bioreactor coupled with membrane unit is phrased as Anaerobic Membrane Bioreactor (AnMBR) and could be an effective solution to address challenges faced in conventional anaerobic systems. Unlike the conventional single stage anaerobic reactor, a membrane coupled system facilitates independent control of hydraulic and solid retention within reactor. Such system can withstand at higher organic loading rate and high operating biomass concentration.

Novelty (Unique features) of the product/technology

AnMBR due to its high biomass retention demonstrates high rate of organic loading which has direct impact on footprint requirements, sludge production as well as reliability of the overall performance. With AnMBR, the start-up time could be reduced at least by 50% to that of any conventional anaerobic treatment process. Due to smaller footprint, the AnMBR can be easily retro-fitted into existing effluent (high-strength) treatment plant scheme.

Unmet need in the product/technology, societal relevance

Usually anaerobic treatment is employed to treat medium to high strength industrial effluents. However, conventional treatment processes need very large footprint for their treatment and fall short on producing discharge quality effluent on consistent basis. Under such circumstances, many times, non-compliant effluent mixes with near-by water bodies, contaminates the ground water table and destroys even the soil capability around the area. AnMBR overcomes the existing drawbacks of conventional systems and ensures consistent performance at substantially lower footprint.

Market Potential & Competition

Industrial sectors in India are already facing stringent regulations on quality of effluent that can be discharged. Enforcement of such regulations will open the market for such technologies. Thermax Ltd. is one of the very few companies around the globe capable

of providing end-to-end solution for such issues. The global Membrane Bioreactor (MBR) market was estimated at USD 838.2 million and is projected to grow at an average annual rate of 22.4 percent, reaching a total market size of USD 3.44 billion in 2018. Establishing AnMBR technology will give more edge over existing aerobic based MBR and hence can increase market share

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Weinnovate Biosolutions

Silvoclean

Brief Description of the product

An all purpose surface sterilization spray, made up of a proprietary formula consisting of Silver Nanoparticles. The spray is

- Effective against bacteria, spores and viruses
- Twice as effective as the current sterilisation sprays
- 10 times safer than the current surface sterilisation agents
- Stays on the surface for longer time saving the user from repetitive application
- Made up of aqueous base; no problem of hazardous chemicals

The spray can be used on any surface and therefore has various applications such as in hospitals, clinics, poultry, food industry etc. The product is launched.

Novelty (Unique features) of the product/technology

The product is a blend of unique silver nanoparticles and has quick surface adherence properties.

Unmet need in the product/technology, societal relevance

Hospital surfaces are the biggest source for spread of infection. Surfaces like patient bedside, examination table are usually not cleaned. These surfaces act as a source of infection as they are touched by patients as well as by healthy individuals. Currently there are no products to treat these surfaces to make them bacteria free.

Market Potential & Competition

Products available in the market are targeted at cleaning the hospital floor or cleaning hands, however there is a gap, i.e. hospital surfaces. The product has potential to cater to all hospitals and small clinics.

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Commercialized in the name of	Silvo Clean
Date of commercial Launch	15th May 2017
7.3 Number of units sold	Under market validation
Number of end users	10

Green Pyramid Biotech

Sophorolipids for Sanitizing/Sterilizing Fruits and Vegetables

Brief Description of the product

The product is a sanitizer for fruits and vegetables before consumption. This formulation can be used by farmers and exporters to increase the shelf-life of their fruits and vegetables multi-fold times. This unique 100 organic formulation removes 99% of pesticides, harmful chemical residues, micro-organisms, pathogens, dust, soil etc. Washing of fruits and vegetables in this formulation has been shown to curtail the shrinking of produce and doubles the shelf life of the products even without refrigeration.

Novelty (Unique features) of the product/technology

Biosurfactant based organic formulation that offers protection against:

- Microorganisms: Bacteria, Viruses, Yeasts, Fungus and Molds
- Dirt, dust and soil
- Cross-contamination during handling
- Chemical and Toxic Residue, Pesticides

It extends shelf-life of fruits and vegetables by nearly two - three times while keeping them fresh and safe. Other salient features of this formulation are:

pH Balanced pH 8.0, Odorless, Tasteless, Non-slimy, Non-sticky, Does not hamper taste, Biologically synthesized from G.R.A.S. cleared yeast using plant sources.

The product cleans fruits and vegetables 90% better than any liquid within a minute

Unmet need in the product/technology, societal relevance

There is no product in the market which is organic and which can remove these harmful chemicals from Fruits and Vegetable in a way that is safe, cheap and harmless.

Market Potential & Competition

In India 76% of the pesticides is insecticide, as against 44% globally. Heavy use of toxic pesticides in agriculture worldwide has raised serious concerns about health issues. The World Health Organization estimates that acute pesticide poisoning (APP) affects 3 million people and accounts for 20,000 unintentional deaths per year, with 99 percent of these fatalities believed to be in developing countries.

Competitors

- Green Wash by Alysynth Remedies Ltd.
- Veg fru wash by Jegson Innovative Industries
- Good home by B R Buildcare Solution Pvt. Ltd.
- Veg Wash Plus by Autodynamics

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A. P. Organics

Gamma Oryzanol and Lysolecithin

Brief Description of the product

- Gamma Oryzanol- A natural nutrient extracted from Rice Bran Oil helpful in managing Cholesterol.
- Rice Bran Lysolecithin Bypass Fat - calcium Soap of Rice Bran Lysolecithin helpful in increasing milk yield and Fat content of milk.

Novelty (Unique features) of the product/technology

Gamma Oryzanol- The nutrient is widely known all over the world for its cholesterol management capabilities. The same has been isolated for direct use through capsules first time in India.

Lysolecithin- Rice Bran Lysolecithin is a known emulsifier having beneficial milk increasing properties. The same has been made into Calcium soap so that the fat can bypass the rumen and thus increase milk yield and fat content in the milk.

Unmet need in the product/technology, societal relevance

Gamma Oryzanol is as per world standard, lysolecithin being a new product cannot be directly compared but requires some more efforts in product development and marketing.

Societal Relevance-Gamma Oryzanol being a nutraceutical can help Indians manage their cholesterol problem in a natural way. Also the same would add value to paddy and thus the secondary agriculture.

Lysolecithin offers an economical source of energy to Indian cattle thus helping Indian dairy sector in meeting their demand for milk production.

Market Potential & Competition

Gamma Oryzanol- Being a new but very known nutraceutical, the market is global, with huge potential in India itself and with the rising trend of cardiovascular diseases

the product will offer a natural solution to this problem. The competition is currently from Pharma Medicines available for the same and also from other Gamma Oryzanol Manufacturers around the globe.

Lysolecithin being a new product has a lot of hidden potential but it will take time for the same to reach its full potential.

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Commercialized in the name of	Ricela Cattle Feed Supplement
Date of commercial Launch	17-04-2016
Number of units sold	28 MT
Number of end users	5

Aspartika Biotech

Value added products from wastes/byproducts of palm oil mills and silk reeling industries

Brief Description of the product

- Silkworm pupa oil enriched with alpha linolenic acid
- Silkworm pupa cake as a rich source of protein
- EggMore-omega : Omega-3 fatty acid enriched egg layer feed supplement
- Growthmin Aqua- Aqua feed supplement

Novelty (Unique features) of the product/technology

Silkworm pupa oil is the cheapest and one of the richest sources of omega-3 fatty acids.

The novel extraction technique helps in the development of an enriched omega-3 fatty acid content which can be used for various human and animal feed applications. Also, this technology focuses on clean tech where remnant of the extract is further utilized for the development of protein rich aqua and poultry feed supplement.

Unmet need in the product/technology, societal relevance

This silkworm pupa is rich in omega-3-fatty acid, however, it is cheaply discarded and becomes an environmental hazard. Additionally, the cake discharged after the extraction of Omega-3-fatty acid is rich in protein (accounting for 65% of the total cake discharged). The amino acid composition of the silkworm pupa comprises all the essential amino acids that satisfy the FAO/WHO/UNU recommendation. Our technology aims at curbing the issue of environment pollution by utilizing the discarded pupa from silk reeling industries and converting it into high value nutraceutical for human and animal consumption. This technology would be an excellent source for silkworm farmers to get money from waste, an effective method of waste reclamation, recycling and reduction and the omega-3FA developed can cater to the needs of 78lakh children or 26lakh pregnant women/lactating mothers.

Market Potential & Competition

Dietary supplements sector is the largest consumer of omega-3 ingredients in terms of volume and value. Increasing awareness about the benefits of a healthy lifestyle will remain the primary driver to the growth of global market for fatty acid supplements.

Also, the animal feed additives market is driven by factors such as increasing livestock population, increasing demand of meat and other animal products.

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Commercialized in the name of	GrowthMin Aqua
Date of commercial Launch	January, 2017
Number of units sold	13 tonnes
Number of end users	Approximately 50 aquaculturists

Cellzyme

Green Manufacturing of Cephalosporin Antibiotics Using Recombinant Deacetylase

Brief Description of the product

Developing a cost-effective technology for green manufacturing of antibiotics using a proprietary enzyme. A novel enzyme will be developed using recombinant DNA technology.

Novelty (Unique features) of the product/technology

- Lower energy requirements
- Lower environmental footprint
- Higher productivity

Unmet need in the product/technology, societal relevance

The technology addresses the challenges faced by USFDA regulated pharmaceutical companies involved in manufacturing antibiotics. The sustainable technology addresses India's commitment to the development of pharmaceutical processes with higher efficiency and minimal waste. The proposed technology will open up a new market with import substitution potential.

Market Potential & Competition

The green chemistry represents a market opportunity that will grow from $2.8 billion in 2011 to $98.5 billion by 2020. The global sales of drugs that could potentially use the proposed product for manufacturing is valued around $1.3 billion in 2012. Potential technologies do exist in other geographies but are not validated yet.

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Nagarjuna Fertilizers & Chemicals

Sustainable and safe enzymatic technology platform for rare sugars

Brief Description of the product

Our technological uniqueness stems from adapting sustainable and safe enzymatic technology platform. The cost and availability of such catalyst renders the existing processes unsustainable. Our process is driven by biological catalysts and widely used raw materials making it sustainable, safe, economical and easily scalable.

Novelty (Unique features) of the product/technology

Our rare sugar technology has resulted in a proprietary process which is used to produce natural rare sugars economically. The three sugar products are Allulose trademarked as Honeytose, Isomaltulose trademarked as Caneose and Trehalulose trademarked as Nectarose. The process is compatible with range of feedstocks- corn, cane, beet etc. making the production scalable. The process utilizes protected enzyme, designed to operate efficiently over broad temperature and pH range and maximize conversion rate and has long sustenance. The process is being protected in key markets across the globe through relevant IP rights.

Unmet need in the product/technology, societal relevance

We aim to develop products that will offer taste, convenience and good health without fear, regret or restraint. Our products are developed to address the following issues:

- Nutritional Value: Natural, not addictive, low calories and low glycemic index.
- Side Effects: Products have no known side effects and are FDA approved as GRAS.
- Psychological: The taste, appearance and uses are similar to sugars hence acts as true sugar substitutes.
- Usage: Can be used in all the food and beverage industries wherever natural sugars and artificial sweeteners are in use.
- Cost: Economical production technology.

Market Potential & Competition

By marketing in high growth markets like India and Asian region- where a CAGR growth of 5.5 is expected, we can reach larger and growing consumer base. Jointly, they would result in enhanced revenues. Furthermore, apart from providing healthy nutritional

options to population with diabetes and obesity ailments, our products are equally adroit to cater to needs of healthy population segments.

Globally only a few companies have presently initiated late stage validation activities. Our advantage lies in process economics, high purity and easy process scalability. There are no major ingredient manufacturers that have a strong consumer brand or customer recall in the natural sugar substitute markets.

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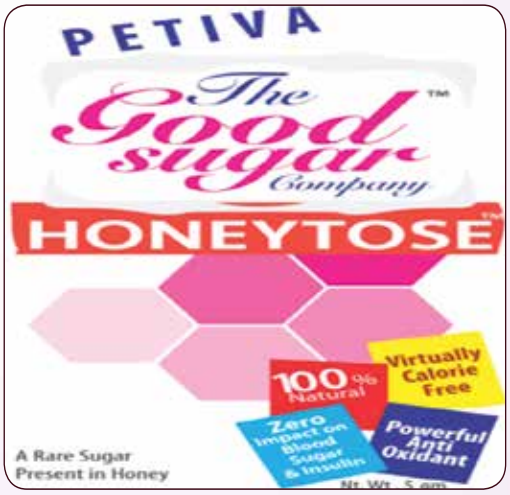

Affigenix Biosolutions

Trypsin clearance assay kit

Brief Description of the product

Enzyme Trypsin is widely used in various biological processes such as Insulin manufacturing to cleave peptide linkers from the pro-drug C peptide removal from Proinsulin and activation of vaccine viruses. Residual Trypsin analysis is used during downstream processing.

Novelty (Unique features) of the product/technology

The kits are customized for end users to meet global regulatory requirements. Niche product developed for Insulin manufacturers

Unmet need in the product/technology, societal relevance

There was no such product available in the market that had adhered to the global quality standard and also met the regulatory requirement GLP. Anti-trypsin antibodies and immunoassay developed by Affigenix intends to address the following societal issues:

- Enables drug companies to monitor the clearance of Trypsin used in downstream processing of Biologics and Biosimilars.
- Enables purifying Trypsin from native and recombinant source
- Removal of contaminating Trypsin in the drug substance or drug product.
- Critical reagents for academic research and by various food industries.

Market Potential & Competition

Readymade Trypsin clearance assay is not available in the market and we believe that every biologics and biosimilar company who routinely uses Trypsin during downstream processing will be our customers. Trypsin manufacturing companies might be our potential customers for affinity matrix as it will aid in purifying the enzyme with fewer steps and thereby reduce the cost of goods.

Diagnostic companies can exploit our antibodies for developing prenatal diagnostic point of test to detect presence of immunoreactive trypsin. Potential therapeutic anti-trypsin engineered antibody drug for treating Pancreatitis is an unmet medical need.

As on date there are no competition for this product

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Commercialized in the name of	Trypsin clearance assay kit
Date of commercial Launch	03/08/2013
Number of units sold	More than 200 kits
Number of end users	4

Embio Limited

Process optimization for conversion of R-PAC to L-Norephedrine

Brief Description of the product

The technology is aimed at converting a chiral alpha-hydroxy ketone to chiral amino alcohol by using a transaminase, using amine donor Isopropylamine, which in turn is converted to acetone. The alpha hydroxy ketone R-PAC is a chiral intermediate coming from yeast whole cell biotransformation. The transaminase is expressed in *E. coli* and the transamination is also a whole cell biotransformation.

Novelty (Unique features) of the product/technology

The technology features a possibility to replace an existing commercial, totally synthetic, chemistry process, with a Green transaminase process based on whole cell *E. coli* biotransformation.

Unmet need in the product/technology, societal relevance

Use of transaminase to produce a low value, high volume product is the unmet need which this project intends to address. As fallout there would be a benchmark on optimized *E. coli* biomass cost.

India is the biggest producer of Efavirenz , which is anti- HIV. Norephedrine is the chiral auxiliary used in the production of Efavirenz. Reduction in Norephedrine price could be passed on to the Efavirenz pricing WHO listing as essential medicine, thereby favouring the patients.

Market Potential & Competition

Current production of the product through synthetic route is about 70 TPA.
Although increase in HIV cases is not seen, there is a stable market for Efavirenz and therefore Norephedrine. Norephedrine derivatives are also intermediates to make amphetamines.

A path breaking chemical route WO/2015/063795 by a Indian company brought down sale price tremendously. Salesplumetted but have recovered in 2017 due to inhouse improvements in the synthetic route.

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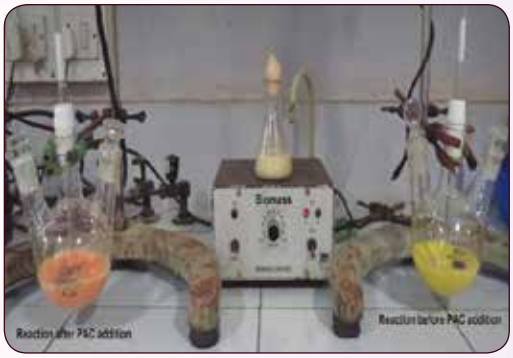

DRUGS & THERAPEUTICS

Virchow Biotech

TULY™ (Rasburicase)

Brief Description of the product

TULY™ is a purified and sterile recombinant product of the enzyme urate oxidase, which is generally labelled as rasburicase. It is produced by a genetically modified E.coli strain. The cDNA coding for rasburicase was cloned from a strain of Aspergillus flavus. It is a water soluble protein with a molecular weight of 34 kDa.

Novelty (Unique features) of the product/technology

Uric acid is the normal end product of purine metabolism in humans. Rasburicase is a recombinant form of uriate oxidase, an enzyme that converts uric acid into an inactive and soluble metabolite allantoin.

Unmet need in the product/technology, societal relevance

Studies have shown that control of high plasma uric acid levels with treatment will have a decisive influence on overall health. It has been shown that within 4 hr after treatment with rasburicase, plasma uric acid levels return to normal levels. In addition, treatment is also very effective in preventing high uric acid levels in patients who are at high risk for Tumor Lysis syndrome (TLS). As the drug rasburicase is useful both in treatment and prevention of high uric acid levels, it also reduces the risk of acute renal failure and other life-threatening complications.

Market Potential & Competition

Competitor Product is Elitek. It is also indicated for the initial management of plasma uric acid levels in pediatric and adult patients with leukemia, lymphoma, and solid tumor malignancies who are receiving anticancer therapy expected to result in tumor lysis and subsequent elevation of plasma uric acid.

Commercialized in the name of	TULY™
Date of commercial Launch	01/12/2013
Number of units sold	27,570
Number of end users	1020

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NovaLead Pharma

Novel topical formulation for treatment of inflammatory skin diseases

Brief Description of the product

The product is a novel topical formulation of existing oral anti-parasitic drug/s which is re-positioned for treatment of inflammatory skin diseases like Psoriasis.

Novelty (Unique features) of the product/technology

This product is topical formulation for treatment of inflammatory skin diseases and has evolved from repurposing of existing oral anti-parasitic drugs. Being repurposed product, significant safety information is already available for the drugs, mainly requiring efficacy to be established for the new indication.

Unmet need in the product/technology, societal relevance

Inflammatory skin disease like Psoriasis is estimated to affect about 2 to 4% of the population in western countries. Topical therapy remains the most commonly prescribed treatment for mild to moderate psoriasis. The existing treatments pose some serious side effects including:

- cancerous effects, skin burning and irritation and odor for coal tar and calcineurin inhibitors.
- Thinning of skin, Telangiectasia, Striae distensae, Acne, Folliculitis and Purpura seen for steroid drugs.
- Changes in skin colour, Bruising and Skin irritation and photosensitivity for Vitamin D analogues and retinoids.

Most of the topical treatments become ineffective over time due to resistance to treatment requiring frequent change in treatment. No new topical drug has been approved by USFDA in last 10 years for psoriasis.

Market Potential & Competition

Sales of drugs to treat psoriasis in seven major markets will increase from a value of USD 3.9 billion in 2010 to more than USD 7.4 billion by 2020, according to new forecasts. Global Data estimated the global eczema therapeutics market to value USD 2,035.5m in 2010. It is expected to grow to a value of USD 3,834.5m by 2018, at a compound annual growth rate CAGR of 8.2 percent. This growth is primarily attributed to an increase in prevalence rate, patient awareness of the disease pattern.

Existing topical drugs are steroids, Vitamin D analogues, Anthralin, Retinoids, calcineurin inhibitors, Salicyclic acid and Coal Tar.

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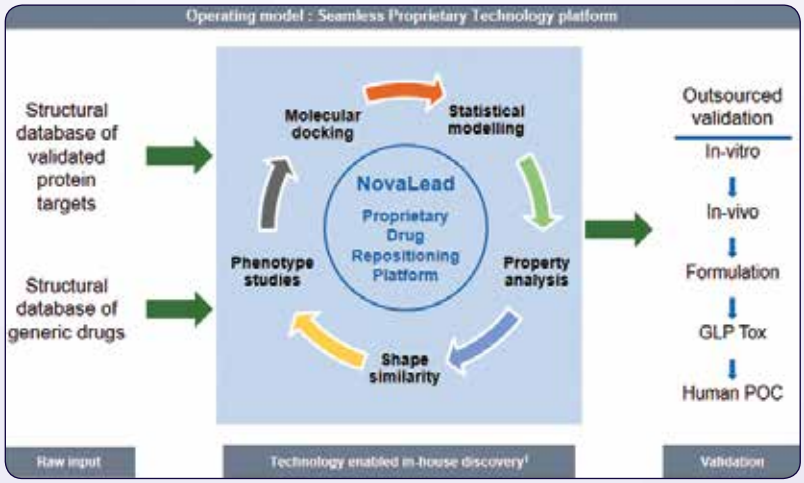

Zumutor Biologics (formerly Theramyt Biologics)

Fucose Knock out technology platform in CHO S cell line for improved Biotherapeutics

Brief Description of the prouct

In this project, we will express glyco engineered antibody in genetically modified mammalian CHO cell line platform with impaired glycan biosynthetic pathway. The modified CHO cell line will be unique platform technology for our products.

Novelty (Unique features) of the product/technology

The glyco engineered monoclonal antibody products were tested for Antibody Dependent Cellular Cytotoxicity function. We have observed 10 folds improvement in ADCC function without any alteration of antigen recognition property.

Unmet need in the product/technology, societal relevance

Till date, there is no glyco engineered monoclonal antibody product available in Indian market.

Market Potential & Competition

This project aims to develop an in-house platform technology for producing therapeutic antibodies with better biological efficacy. The modified CHO cell line is one such initiative that will differentiate Theramyt from other Biosimilar development companies in India. As per market intelligence and reports, the unique proposition of production of glyco engineered monoclonal antibody molecules using modified CHO cell platform and process development for furthering such monoclonal antibody products, is novel in India. The platform will be used for our in-house product development.

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CyCa Oncosolutions

A molecular needle as a novel platform for delivery of anticancer drugs

Brief Description of the product

We have developed a versatile nontoxic, high speed, high precision molecular machine CyCa delivery device (CyCa-dd) that can carry molecular cargoes directly into living cells. Our proprietary material CyCa-dd is like FedEx for drugs. It employs a unique and highly efficient technique to deliver cargoes right into the cells without damaging them as smoothly as you cross automatic doors with your luggage. It transforms drugs from toxic to specific. This will reduce the dose and side effects thereby improving the quality of life for patients.

Novelty (Unique features) of the product/technology

Our proprietary device CyCa-dd is a non-liposomal material, which has low toxicity, low batch heterogeneity, high stability, high oral availability and specific drug loading. The USP is its novel cell entry mechanism based on a harmless membrane drilling mechanism. This mode of cell entry of drugs overcomes the disadvantages of endocytic mode of cell uptake and degradation of drugs in endosomes.

Unmet need in the product/technology, societal relevance

Chemotherapy is toxic like carpet bombing. Crossing this barrier is vital for drug discovery and development. So it is of paramount importance to develop a delivery vehicle, which can efficiently guide the drugs across the membrane barrier. The success of this project will have high societal and market impact given the fact that cancer is the one of the leading cause in mortality and morbidity worldwide. 8.2 million deaths, 15 million new cases and expected rise by 70% in next two decades especially in the low- and middle-income countries. This will advance the global fight against cancer and reduce the public health burden.

Market Potential & Competition

Expected growth of Indian market for novel anticancer drugs or drug formulations is about 85 billion$ by 2020. Globally total addressable market TAM is $ 75-80 billion out of which served available market SAM is $ 3-4 billion and our target market is 10 of SAM.

Our competitive products are liposome based drug formulations. There are mainly two anticancer drugs with liposomal formulations are available in market.

- The global liposomal doxorubicin market was valued at USD 814.6 million and is expected to grow at a CAGR of 6.4 over the forecast period and is expected to reach a value of USD 1.39 billion by 2024, according to a new report by Grand View Research, Inc .
- The global liposomal Cisplatin market is $ 750 million, which is 30 of total 3.2 billion USD of platinum anticancer drug market.

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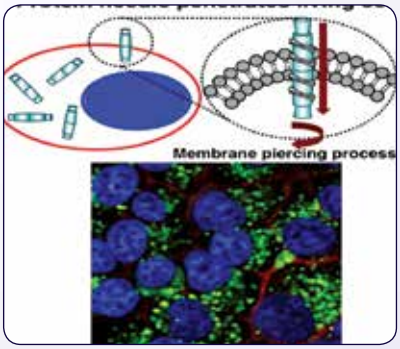

AGRICULTURE

Swasti Agro & Bioproducts

Preventing diseases of plants: XanSil and BioAvert

Brief Description of the product

The team has developed Field Analysis Techniques such as hyper spectral imaging, microscopy and field tests which help detect problems in the fields of farmers. These techniques give precise and rapid problem detection thereby saving time and input costs for the farmers. The techniques can also predict disease pattern and attack of certain key pathogens. This completely organic, sprayable biotechnology based products derisk the farmers by preventing diseases with a three pronged approach. The company also provides analysis cum advice system healthcare system for the plants which can be delivered to the farmer through their android app “Happy Crop”.

Novelty (Unique features) of the product/technology

Rapid problem detection provides correct advice to the farmer within 24 to 72 hrs. Analysis at point of care negates the requirement of sample collection. This product is a digital solution in agriculture providing 360 degree analysis and advice. This scientific exercise leads to reduction in input costs by 15-35%.Technology driven back-end support and products further increase the yield by 20-40 folds and enhances produce quality. The total Return on Investment for farmer can be 10x or higher.

Unmet need in the product/technology, societal relevance

This technology delivers a complete health care package to the farmer ranging from preventive products to services. These services will help the farmers reach towards a sustainable and precise agricultural practice which is dynamic to adapt to both favorable and drastic conditions. This technology gives data driven precise and rapid advice to the farmers at low cost.

Market Potential & Competition

Over 240 Million Acres where farmers suffer a loss due to diseases. This causes a loss of 1500 Billion INR annually. There are major pockets around the world with key

agricultural problems and analysis show that a majority of crop is lost due to diseases all over the world.

Many types of analysis are available ranging from lab analysis, sensory probes to automated stations and lab based analysis techniques. The focal point of these products are high purchase / leasing costs, vast time taken between sample collection and lab analysis, slower turnabout time of the derived data to the farmer, and the farmers inability to interpret the generated data.

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Vel Natural Fibers

Method for extraction of silk grade banana fiber

Brief Description of the product

After harvesting the banana punch, remaining portion of the tree becomes agricultural waste. From the waste valuable silk grade fibers are extracted.

Novelty (Unique features) of the product/technology

Our technology extracts silk grade uniform single filament yarn. The shelf life of the extracted fiber will be more than 20 years.

Unmet need in the product/technology, societal relevance

Our technology extracts pure silk grade single filament yarn from banana tree. This product and innovation is agriculture based and it is extracting wealth from the waste. So it will get lot of rural employment opportunities.

Market Potential & Competition

This innovation has very good market potential in India and International scenario. We have received many quires all over the world.

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CisGen Biotech Discoveries

ParvoCure

Brief Description of the product

ParvoCure is an enteric protected oral tablet to treat or prevent Parvoviral enteritis in dogs. The tablet contains >100,000 HI units of anti-parvoviral antibodies raised in chicken and formulated in a way that the active ingredient is released in intestine were antibodies that neutralize the virus thereby curing the disease.

Novelty (Unique features) of the product/technology

There is no equivalent product in market. ParvoCure is an oral formulation which acts on the virus directly in intestine and is found to be effective in clinical phase. It is affordable when compared to other treatments. The currently available treatment is transfusion of hyper-immune dog plasma which may lead to spread of other exotic pathogens to local canine population and requires visit to veterinarians. Since our product is derived from non-invasive methods, there is no danger of introducing any pathogens and since it is an oral formulation, it can be given by the owner.

Unmet need in the product/technology, societal relevance

Canine Parvovirus (CPV) is prevalent worldwide and the rate of infection is approximately same in both vaccinated and unvaccinated dogs. It is relatively a stable virus and 100% morbidity can be reached in naive population. Therefore, it is difficult to prevent disease transmission in in-contact animals. The disease can spread during veterinary clinic visits also. Chicken egg yolk derived antibodies are cheaper source of non-invasive method of producing antibodies with widespread avidity. Therefore, oral formulation with IgY can be used as an affordable preventive therapy in CPV suspected cases.

Market Potential & Competition

CPV is prevelant worldwide with high rate of morbidity. Even though commercial polyclonal dog plasma is available for its treatment, it is not being used widely due to its high cost. Our oral formulation is cheaper and user friendly when compared to that of available commercial solution. Since the disease is widespread and prevelant, there is a naive market for the product.

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Healthline

SeriCell

Brief Description of the product

SeriCell is a silk protein based cryo-preservative medium to sustain viability and motility of semen to enhance success rate of artificial insemination. Silk proteins are non-cytotoxic and non-allergenic. There is considerable evidence in literature for its use in maintaining insect and even mammalian cell lines in FBS free cryo-media. Application for use in semen diluents is a novel idea around which SeriCell has been developed.

Novelty (Unique features) of the product/technology

Current semen diluents make use of fresh egg yolk as an important ingredient. This ideally should be obtained from SPF eggs. However practically commercial eggs are used---very often bringing in pathogens. Every time a batch of diluent is made, the egg component has to be added last minute.

The advantage with SeriCell is that it can be pre-formulated, stored and transported with a 12-18 month shelf life. Moreover it can be heat sterilized, to keep it infection free.

Unmet need in the product/technology, societal relevance

While several semen production stations use fresh table eggs and manage by addition of antibiotic in the formulation to inhibit pathogens, sensitive semen is always diluted using expensive imported diluents purchased from animal genetics companies of France and Germany.

Market Potential & Competition

With a production of over 2 crore semen doses produced in approximately 50 acredited semen stations, even replacement of 10-15% of the current diluent with the advanced diluent like SeriCell could create a HUGE market potential only in the formal govt. regulated /Coop sector. Besides this there is a fast expanding 'trade' sector.

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Rope Production Centre

Value addition and waste utilization in Banana pseudostem

Brief Description of the product

- Banana Pseudo stem rope cutting machine
- Automatic Rope making machine
- Power rope machine – 0.5hp motor (rope only)
- Power rope winding machine- 1hp motor (rope and winding)

Novelty (Unique features) of the product/technology

a) The machine is able to cut 14 banana pseudo stem sheath /time and 5000 sheath / day which saves the labor of 6 numbers
b) The banana rope of 1500m/hr 4500m/hr for 4 roll and in a day 36000m of banana rope can be produced which saves 20 labors
c) Capacity 8000-10000 m rope produced /8hrs
d) Capacity 12000 – 20000m rope produced / 8hrs

Unmet need in the product/technology, societal relevance

- Banana farmers of all categories (small, medium and large farmers) can use the products.
- Effective utilization of banana pseudo stem waste into product with lost cost technology.
- Rural employment opportunities are scarce. This technology will open up new avenues for gainful employment.

Market Potential & Competition

- Potential product for domestic and export market.
- Ideal for Small and medium enterprizes .
- Business opportunities Banana by products and Khadhi Industries.

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Tea Research Association & Varsha Bioscience and Technology

Development and promotion of local fungal strains of tea ecosystem for management of tea pathogens and insect pests

Brief Description of the product

Indigenous strains of three micro organisms i.e. *Trichoderma harzianum KBN-29*, *Beauveria bassiana* BKN-1/14 and *Metarhizium anisoplae* Met-5-1 have been developed. For the mass multiplication of these strains, media and pH were optimized. The compatibility of the strains with common pesticides, temperature tolerance study and shelf life study has been completed. *In vitro* and *in vivo* bioefficacy of the developed formulations were assessed at multi-locations for the control of die back *Fusarium solani,* blight Pestatotiopsis theae, tea mosquito *Helopeltis theivora,* red spider mites *Olygonychus coffeae* and live wood eating termite *Microceroterme ssp* of the tea crop respectively.

Novelty (Unique features) of the product/technology

The three biological control agents BCAs namely, *Trichoderma harzianum, Beauveria bassiana and Metarhizium anisoplae* are indigenous isolates, developed from the tea ecosystem of West Bengal itself. It is proven that the efficacy of these isolates is superior to any outsourced isolates other than tea ecosystem , because these are already well acquainted with existing environmental conditions of this region.

Unmet need in the product/technology, societal relevance

The field application of these would certainly solve the rising problems caused by large scale use of pesticides and residues found in tea to a great extent. This will also control the diseases and insect pests successfully. The residual problem is much more common in case of inorganic chemical pesticides, insecticides, fungicides, weedicides etc. because of their longer persistence in nature, hence the harvesting interval of tea crop is very short (7-15 days interval).

Market Potential & Competition

Tea cultivation in West Bengal is an organized sector which occupies a large area approx. 140440 ha under this crop. In addition, a large number of small tea growers STG have also been engaged in tea cultivation in the state.

Some local manufactures have already been marketing such products in this area since last several years. Even then, our formulations, which would be marketed shortly, have greater scope due to its quality. The cost of similar products available in the market, ranges from INR 175-900/- per kg or litre. We plan to sell this formulation at rate of about INR 200/- per kg for wettable powder formulation, which is rationale, affordable as well as acceptable amongst majority of the planters.

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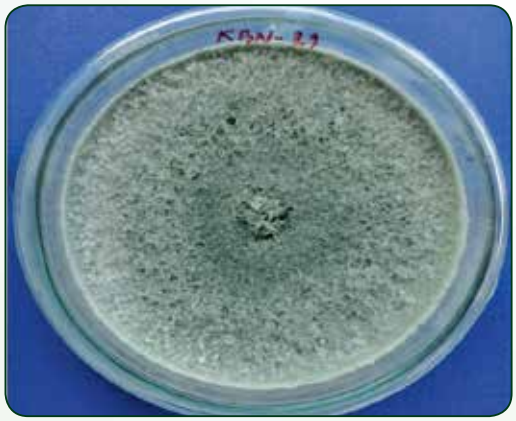

K N Biosciences

Fermentation technology for entomopathogenic nematode (EPN) production

Brief Description of the product

The biocontrol agent of an entomopathogenic nematode is being utilized for various agriculturally important crop pests' management to save environment and act as an ecofriendly approach to make chemical free environment. The infective juveniles of nematodes kills the pests within 24 h and make them inactive which will further develop to establish its progeny in a suitable soil.

Novelty (Unique features) of the product/technology

The product of 'Nema Powder' developed under SBIRI Phase I which deploys fermentation based mass production technology. The shelf life is minimum of 3 months. The pathogenicity studies were confirmed on various agriculturally important crop pests like; Cotton boll worm (*Helicover paarmigera*), Tobacco cut worm (*Spodopterallitura*), Diamond back moth (*Plutella xylostella*) and maize stem borer (*Sesamia inference*) in the field around Hyderabad and Mehaboobnagar districts.

Unmet need in the product/technology, societal relevance

Agriculturally important cash crops like; Cotton, Tobacco, Sugarcane, food crops of rice, vegetable and maize is receiving more attention among the farmers in Hyderabad and Mehaboob Nagar area. This is an ecofriendly approach in the agricultural farming community.

Market Potential & Competition

Currently there is an increase in demand for EPN among the farming communities to control various agriculturally important crop pets of sugarcane shoot borer & root grub, vegetable pod borers, cotton boll worm and various rice pests. There are several companies working towards the mass production of this entomopathogenic nematode which is increasing competition in the industry day by day.

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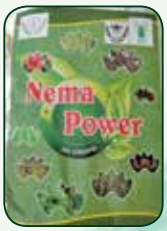

Tata Chemicals

Micronutrients loaded on nanosilica: Boosting crop health and yield

Brief Description of the product

Zinc-nano silica 20% powder formulation has been tested across geographies and across different crops. The product shows yield improvement and is either at par or at times superior to current market benchmark (EDTA-Zn).

Novelty (Unique features) of the product/technology

• This is a nanotechnology based product. This is the first such product in the crop nutrition segment. • The process is simple, novel and scalable and can be produced using commercial grade chemicals. • The product and process are cost effective. • The product not only enhances the crop yields, but also improves the nutritional value of the crops. • The product opens up new avenues for research in this area.

Unmet need in the product/technology, societal relevance

There are many problems in Agriculture today. To name a few: Increasing population, reduction in arable land, increasing food demand, worsening soil conditions, reducing crop nutrient content. Current agri-practices are not sufficient to address most of these problems. New "out of the box" technologies such as Nanotechnology can bridge this gap. Our product not only increases the crop yields but also enhances the crop nutrition. This will help the farmers with increased income and healthy soil due to reduced usage.

Market Potential & Competition

Currently no competition exists in this category. Salt forms are cheaper but have low use efficiency (3%). Chelated forms are better but expensive. Our product offers cost effectiveness and superior performance. The total micronutrient market size is INR 1000 Cr in India.

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