

Ageing suit to simulate ageing for sensitive design of cities.

Funding Requirement INR-1Cr over **3 years**

Objective

To create a low-cost, empathy-triggering, wearable suit to simulate conditions of ageing.

Impact

The project will develop a wearable Ageing Suit that will simulate the challenges faced by older persons when negotiating built spaces – roads, offices, shopping malls, and accessing public transport. The Centre for Policy Studies will collaborate with the IDC School of Design at IIT Bombay to design, develop, and display the suits for urban planners, architects, product designers, and policymakers to wear and experience an older person's challenges in negotiating city spaces.

Project Description

A distinct lack of empathy for the interests of older persons in policy making. In an ageing society, frailties stemming from ageing generate a unique set of justifiable demands and distinct policy attention.



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A high-density cerebral metabolism and blood flow imaging system for stroke diagnosis and treatment

Funding Requirement INR- 1.5Cr over 3 years

Objective

- Developing Research tool Product development and subsequent commercialization of the Small animal imaging platform, helping research laboratories in academia and industry
- Clinical trials of the developed technology, may lead to an indigenous optical imaging system for brain imaging with applications in diagnosis and treatment of stroke and neurodegenerative diseases.

Impact

- Developed a novel high density Cerebral Blood Flow (CBF) measuring system which is relatively inexpensive.
- Translate the developed

Project Description





technology for preclinical (small animal) imaging and clinical imaging (stroke patients)





Principal Investigator

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Bioactive hydrogels for diabetic wound healing.

Funding Requirement INR- 44L over 2 years

Objective

- Fabrication and characterization of bioactive hybrid hydrogels.
- In vitro characterization of wound healing efficiency of hybrid gels.

Impact

We will develop bioactive wound dressings for treating DFU. These dressings will enhance fibroblast proliferation, migration and collagen synthesis by disrupting the surface glycocalyx.

Project Description

Impaired wound healing is a hallmark of diabetic foot ulcer (DFU) and can lead to amputation of the limb in patients with diabetes. There are currently no good solutions for DFU treatment apart from wound management.



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Heat wave hazard, vulnerability and risk assessment for India.

Funding Requirement INR- 47 L over 3 years

Objective

- Collection and analysis of meteorological data such as that of temperature at fine scales. This step would involve development of multivariate statistical techniques for characterization of heat wave hazard.
- Collection and analysis of socio-economic vulnerability data. This step would involve assessment of \bullet demographic data from the latest Census of India, on-field surveys and disaster impact data such as loss and damage, with a particular focus on mortality.
- Development of multi-criteria decision making-based methods for aggregation of vulnerability \bullet indicators.
- Final integration and graphical and numerical representation. •

Impact

Our study is aimed at developing fine resolution heat wave risk maps over the North Indian region.

District-wise hazard and vulnerability information will be integrated to decipher their individual roles in enhancing risk of heat waves and associated impacts such as mortality and health degradation. Therefore, our analysis can inform climate and heat action plans of municipalities and corporations. Further, our study will assess future contributions of hazard and vulnerability on the risk of heat waves and can contribute towards planning and adaptation for a net-zero emissions target in India.

Project Description

In this study, we aim to assess hazard, vulnerability and risk of heat waves in India. While coarser resolution analysis will be taken up at the country-level, finer, district-wise analysis will be carried out with a focus on regions in North India that are prone to pre-monsoon heat waves in India. Finally, the study will investigate how such risk is likely to evolve under future climate change.



Principal Investigator

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An Economical Scalp Cooling Device for prevention and treatment of Chemotherapy-Induced Alopecia. Funding Requirement INR- 2Cr over 1.5 years

Objective

- Design and Development of a portable, affordable, and energy-efficient scalp cooling device/ helmet using cryo-fluid and Phase changing material.
- IoT integration and addition of remotely controllable features.

Impact

The usefulness of Scalp cooling during and after chemotherapy has been established extensively. However, due to its high cost, most patients can't afford it. In this invention, we aim to make it available to cancer patients at an economical cost. This will not only prevent hair fall but also boost up their selfconfidence and self-esteem. Passive cooling of the scalp during and after chemotherapy our costeffective, low power consumption, the portable cooling system will increase patient compliance, and

adherence to therapy and improve their quality of life.

Project Description

Scalp cooling is an advantageous way to prevent chemotherapy-induced alopecia (CIA). It is also essential for patient comfort during chemotherapy. However, most of the existing equipment is placed inside a hospital and is very costly. Because of the high cost of purchase and maintenance, such equipment is not abundantly present. CIA is a very distressing problem in cancer survivors. Existing arts use external cooling systems with a circulating liquid. The equipment is fastened to a common point, and at a time maximum of two patients can be fitted with the same. This makes the devices unfordable, stationary and underutilized by most chemotherapy recipients. Our project aims at making the same widely available, ergonomic, portable, economical, and easily accessible.



Principal Investigator

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WEL-Dx: Low-cost alternatives for RT-qPCR for DNA sensing in end-use settings developed at Wadhwani Electronics Lab (WEL)

Objective

We have developed low-cost DNA sensing assays based on electrochemical and optical detection methods. The assays are based on intercalating dyes, without the need for a fluorescence microscope/fluorescence setup/ excitation and emission filters/sophisticated camera setups. We aim to do extensive testing and validation of prototype [TRL 7], Benchmarking against gold standard RT-qPCR with a large number of samples, Field-testing in various applications (e.g. water quality, AMR, pathogen sensing in wastewater).

Impact

DNA sensing and quantification require the use of expensive albeit highly sensitive and accurate technologies such as qPCR, or comparatively lower-cost alternatives such as micro-PCR systems or Nanodrop spectrophotometer, which still cost upwards of a few lakhs INR per instrument. We have developed electrochemical and optical DNA sensing assays integrated with electronic systems for sample preprocessing, amplification and analysis, that is better than the low-cost alternatives.

Funding Requirement INR- 50L over 2 years

Project Description

Our setup provides a low cost (instrument BOM cost < INR 10,000), compact (< 12-inch x 12-inch x 6-inches, with integrated thermal cycler/isothermal heating stage) and portable solution for point of care detection of DNA. In collaboration with Prof. Kondabagil and Prof. Paul at the BSBE, IIT Bombay, we have conducted preliminary testing of the functional prototype with nucleic acid isolated from bacteriophage virus phi6 (lab surrogate for SARS-CoV-2), E. coli, Plasmodium falciparum etc. Presently, the technology is at TRL4.



Principal Investigator

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'OXYHEAL'- A Flexi-baric Portable Oxygen Therapy Device.

Funding Requirement INR- 1.5Cr over 1.5 years

Objective

- Development of an IoT enabled device to deliver variable pressure oxygen flow focused specifically on affected body parts like hands, limbs, legs, wounds, face or full body.
- Incorporate safety features like prevention of barotrauma and claustrophobia
- Develop an affordable, versatile, portable device using oxygen concentrator and compressor

Impact

A variable pressure oxygen flow focused specifically on affected body part, eliminates barotrauma and claustrophobia for the patients undergoing oxygen therapy for healing wounds. It will be useful in Diabetic Ulcers/ Wounds, Surgical Wounds, Non-healing Ulcers, Decompression sickness, Altitude sickness, Gangrene, Frostbite, Cancer Hypoxia, Carbon monoxide poisoning and many other diseases.

Project Description

Breathing pure oxygen in a pressured environment or topically applying high-pressure oxygen is Hyperbaric oxygen therapy (HBOT). Various disease conditions, as mentioned above, can be treated using inhaled or topical HBOT. At present, HBOT is institutionalized. Patients cannot afford to have an HBOT setup at home. OxyHeal is a portable and need based therapy device which brings O2-therapy to patients' home without needing hospitalisation.



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Pharmaceuticals and Gendered Minorities: Embodiments, Medicalization and Drug Governance. Funding Requirement INR- 50L over 5 years

Objective

To examine the complex interplay of drugs as documenting from an ethnographic research within the pharmaceutical companies about the materiality, efficacy and experience of the chemical facts within the given subject population

Impact

This project is about Academic and Policy-based research on Gender, Sexuality and Pharmaceutical Research. Often, the Pharma-based research undermines the cultural, social and psychological interplay of the service users or the 'patients', often leading to further discrimination, stigma, rather building 'cure'. This research would enable in a social, hermeneutic and phenomenological approach to Pharma-based industries that would lead to a 'social' 'humane' approach to marketing and commercialization.

Project Description

Keeping, 'gender' and 'gendering', or the pharmaceuticalization of bodies, in mind - this study would make an attempt to understand the 'institutionalization of drugs' and medicinal governance through drug enforcement agencies by the global drug governance that in a way ensues a trick of power and subjection. Scholarly attention to this proposed project maps the dynamics of pharmaceuticals in human lives that further influence global, International, and local circulation of identarian categories through biomedicalization and 'essential drugs'



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Development of a Device for Fundus Imaging for Glaucoma diagnosis and Documentation.

Funding Requirement INR- 40L over 2 years

Objective

- To develop a slit lamp based device for imaging the Fundus for diagnosis and management of Glaucoma.
- Development of control system and AI based primary diagnostic application for Glaucoma.

Impact

Fundus of the eye refer to interior surface of the eye opposite to the lens. Several techniques are available commercially to acquire fundus images, they are extremely expensive and out of reach of rural masses along with most of the urban masses. In diseases like glaucoma, the fundus picture must be frequently scanned to estimate disease progression for effective management. IIT Bombay researchers are developing an affordable, portable and easy to use device for imaging fundus of human eye.

Project Description

Fundus imaging is painful, especially mydriatic ones, and depends on the clinician's judgement and expertise. This exposes patients to human errors, which can be minimised. Thus, a device that can consistently gather fundus images and is affordable enough to be sold as consumer goods is needed.



Principal Investigator

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A one-stop solution for tinnitus awareness, prediction, diagnosis and its management. Funding Requirement INR- 35L over 2 years

Objective

- To develop and test an AI/ML based tinnitus predictive and management platform for the tinnitus patients.
- Testing the AI/ML based tinnitus predictive and management platform on the adequate number of tinnitus patients, with promising results.
- AI/ML based tinnitus predictive and management platform and field test reports.
- To create awareness of tinnitus amongst the young population age between 18–35 years.

Impact

The predictive solution will be based on 'precaution better than cure'. The higher probability person would be taking more precaution to avoid tinnitus. Moreover, comorbid conditions can be managed to avoid a secondary outcome as tinnitus. The precise diagnostic device will help doctors for better patient management over the treatment interval which could be long. The tinnitus management solution will help in improving tinnitus related quality of life.

Project Description

The prediction and management software will be tested in the hospital setup with adequate number of patients under supervision of ENT specialist. The final version of the tinnitus predictive and management platform will be developed based on the results which will be obtained in the first field testing and suggestions from the medical fraternity.



Principal Investigator

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Parkinson's Disease - Gait Instability Assistance, a smart physiotherapy and rehabilitation equipment.

Funding Requirement INR- 1.6Cr over 1.5 years

Objective

- Design and Development of a device to give visual and auditory cues to initiate and stop movement.
- Synchronisation of the movement with the position of limbs and stretching of muscles.
- Integration of fall prevention features in the device, Integration of IoT, and remotely controllable features.

Impact

Published research suggests that PD patients can be benefitted from continuous or intelligent sensory cueing systems during freezing of gait. Our device will deliver cues and act like a "smart" physiotherapy and rehabilitation device. It will improve the life of the patients suffering from Parkinson's disease and give them independence.

Project Description

This invention aims at developing a project that would deliver real-timed visual and auditory cues to a patient with Parkinson's disease or ataxic conditions/gait instability, etc. This can consist of motion sensors, posture, and balance sensors to assess the position of limbs and center of gravity, guiding the patient with initiation and maintenance of gait and termination as well. Sensory cues like the sound of a metronome or march past and a virtual grid using laser beams can help the patient to maintain a proper line of gait and prevent them from losing their balance or falling.



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Ayurveda-based soft gel vaginal inserts for the treatment of vulvovaginal atrophy and perineal laxity in menopausal syndrome.

Funding Requirement INR-1Cr over 1.5 years

Objective

- Proof Of Concept
- Prototype Development
- Production Ready Model

Impact

Ayurveda drugs which are phytoestrogen can be efficient in the management as they perform function by binding directly to the estrogen receptor without enhancing the endogenous estrogen levels. An applicatorfree, vaginal-mucosal adhesive, soft gel capsule Ayurveda formulation that will be used to manage multiple symptoms of menopause - atrophic vaginitis, dyspareunia and perineal laxity.

Project Description

Vulvar and vaginal atrophy (VVA), a component of the genitourinary syndrome of menopause (GSM), is a common condition, with symptoms occurring in up to 50% of postmenopausal women. 2002 Women's Health Initiative (WHI) study showed that the long-term use of certain synthetic hormones (a combination of medroxyprogesterone acetate and conjugated equine estrogens) increased the risk of breast cancer, stroke, heart attack and blood clots. There is a need for a new, safe and convenient treatment option.



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Co-Principal Investigator

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Dean Alumni and Corporate Relations Office, IIT Bombay





Ayurveda based Nano-Nasal droplets for management of Polycystic Ovary Syndrome.

Funding Requirement INR- 1.2Cr over 1.5 years

Objective

- Proof Of Concept
- Prototype Development
- Production Ready Model

Impact

Women seeking help from health care professionals to resolve issues of obesity, acne, amenorrhea, excessive hair growth, and infertility often receive a diagnosis of PCOS. Because the primary cause of PCOS is unknown, treatment is directed at the symptoms. Our product will be a novel solution for the multi-system disorder targeting the pathophysiology and thus reversing it. Currently women suffering from PCOD are bound to take multiple medications simultaneously. Through this multitarget therapy, we will be able to solve this problem affecting over 116 million women world-wide.

Project Description

Polycystic ovary syndrome (PCOS) is one of the most common reproductive endocrine disorders in women and despite this, diagnostic challenges, delayed diagnosis, and less-than-optimal treatment regimens plague the condition. It is one of the common causes of female infertility It is often associated with psychological impairments, including depression and other mood disorders and metabolic derangements, chivey insulin resistance and compensatory hyperinsulinemia, which is recognized as a major factor responsible for altered androgen production and metabolism. Current prevalent challenge are adverse effects associated with hormonal therapy, lack of speific treatment and use of multi-drug.



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Algorithmic Nudging and Information Elicitation For Health Insurance

Funding Requirement INR- 35L over 2 years

Objective

Development of frameworks and algorithms for

- Eliciting authentic information of health insurance users
- Using this information for nudging users towards better lifestyle choices and lower health expenses

Impact

Underwriting, traditionally prone to information fudging, will be sharpened by making it strategy-aware. Reduction in claims and payouts due to better lifestyle choices and hospitals for treatments. Opens up possibilities of cross-selling of new products.

Project Description

Nudging, popularized by the Nobel prize winner Richard Thaler, involves guiding a user towards a predefined "right behaviour", for the user or the system as a whole, without restricting choices or imposing financial incentives or penalties. An insurer can suggest a user healthier lifestyle options, or hospitals for lower waiting times/costs. The proposal is to provide these customized nudges in an algorithmic manner using the data of the user. The complete loop involves information elicitation from a user to eventual nudging.



Principal Investigator

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A paradigm shift in thermometry for application in defense, health, and manufacturing

Objective

Design, develop, and demonstrate technique for ultrafast thermometry

Impact

- Nation's defense sector where electromagnetic warfare are employing ultrashort pulses to melt the target
- Pulsed laser manufacturing industry that uses femto- to nano-second lasers for precision cutting
- Medical surgeries such as laser eye surgery and tumor removal
- Materials design of light-weight and high-specific strength superalloys that can withstand intense laser pulses.

Project Description

Thermometry is the most widely used technique in mechanical engineering. Thermometers, probes, and non-contact approaches are three general categories of temperature monitoring. The timescale of measurements of existing approaches ranges from milliseconds to seconds. Electromagnetic warfare where ultrashort pulsed lasers melt the target, explosion dynamics, and recent advances in manufacturing processes, i.e., femtosecond to nanosecond pulsed laser cutting, laser surgeries, have necessitated the temperature measurements at the timescale of femtoseconds to nanoseconds. Current technology does not allow such measurements as even our electronic switches do not operate at ultrashort timescales. Hence, the proposal aims to design and develop ultrafast thermometry equipment (femtoseconds to nanoseconds time scale).

Funding Requirement INR- 16L over 3 years

Principal Investigator



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Development of a complete OCR framework for historical Medical record Digitization

Funding Requirement INR- 1 Cr over 2 years

Objective

1.To develop a State of the Art Automatic Al-based OCR of text from scanned images2.Development of a Post-editing system for OCRed texts using an interactive platform3.To create searchable PDF documents with image and text layers

Impact

As hospitals have started digitizing their record-keeping processes, their records were usually scanned documents that were complementary to physical medical records. These scanned documents can only be viewed as an attachment and are not searchable. This project will create a set of tools that allows us to use both AI technology and physical annotators for the digitization of these medical records.

Project Description

The Project aims to develop an end-to-end solution for creating a collection of digital, searchable copies of scanned printed/handwritten medical records. This solution will be able to understand the structure of the document, and will feature an AI-based OCR customized to Indian languages and context. The system will also integrate Name-Entity-Recognition (NER) for searchability. A browser based tool will be provided to edit the digitized texts.



Professor In charge

Prof. Ganesh Ramakrishnan

Institute Chair Professor Department of Computer Science and Engineering, IIT Bombay



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Development of OCR framework for Digitization of Medical Records

Objective

- 1.To develop a State of Art Automatic Al-based OCR of text from scanned images, along with an interactive editing system
- 2.To create a digitally accessible system of past medical records.

Impact

As hospitals have started digitizing their record-keeping processes, their records are usually scanned documents, which are not searchable. This project will be used for the digitization of these medical records. This will fulfill one of the goals of NDHM – National Digital Health Mission is to strengthen existing health information systems, by ensuring their conformity with the defined standards.



Funding Requirement **INR-1** Cr over 2 years

Project Description

This solution will be able to understand the structure of the document and will feature an Al-based OCR customized to Indian languages and context. An accessible browser-based tool will be provided to edit the digitized texts. This is to create a system of personal health records, based on international standards, easily accessible to individuals and healthcare service providers – as is one of the objectives of NDHM.



Principal Investigator

Prof. Ganesh Ramakrishnan

Institute Chair Professor

Department of Computer Science and Engineering, IIT Bombay



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An evidence driven personalised nutrition & cognitive training to improve lives of marginalised children Funding Requirement INR- 97.5L over 1 year

Objective

With balanced nutrition, various aspects of a child's life can be transformed. The Project aims at changing the lives of 400+ children (including about 50% girls) from marginalized communities in the suburbs of Mumbai. A preintervention and postintervention statistical study shall be presented to indicate the project's impact on their overall wellness metrics as an impact of the nutritional intervention, which includes health status and immunity score for everyone; and cognitive abilities and optimal physical growth based on WHO guidelines for children.

Impact

India is one of the fastest-growing countries economically, educationally, and technologically. However, COVID-19 pandemic has affected us, both socially and economically. In Mumbai, 41% of the population lives in slums with lack of access to pure water and sanitation, high density of population, and poor infrastructure pose serious health risks. Through this initiative, we aim to impact around 400+ children's lives by supporting their educational and nutritional needs, thereby contributing to their overall growth and development.

Project Description

We plan to initiate the nutritional intervention project in selected locations given by the sponsor. This project is to first evaluate and choose an optimum strategy to contribute to the holistic development of marginalized children, primarily because of the recent COVID-19 pandemic. We aim to provide them better opportunities for education and nutrition. The Project will assess the nutritional, physical, and cognitive status of the children in the community. Based on the assessment, we will plan and execute interventions (nutrition and cognitive stimulation).



Principal Investigator

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Development of a culture system to grow stem cells for tissue engineering and regenerative medicine Funding Requirement INR- 1 Cr over 5 years

Objective

We propose to design a system that will efficiently grow stem cells in the labs. If successful, this research may be a game changer in tissue engineering, stem cell therapy, and regenerative medicine, and will eventually help thousands of ailing patients.

Impact

In regenerative medicine, stem cells are seen as the silver bullet. They have the potential to form and heal any damaged organ. Adult stem cells, have great therapeutic possibilities in various diseases including tissue damage due to accidents, loss of tissue due to aging, cardiovascular diseases, diseases related to immune response, and cancer. However, they are scarce & limited growth potential in the lab. This limited availability of stem cells is a major bottleneck to realize their full potential.

Project Description

We have found that stem cells grow better on soft materials & skin stem cells, important for burn wound healing also grow faster on our optimized material. We want to understand the mechanism behind such control so that we can design an even better system. We also want to do a quality control check (for future clinical use) on stem cells grown on our lab-developed materials for their various properties and therapeutic potentials. Once satisfied at lab scale, we wish to check in animal models and then collaborate with clinicians for relevant clinical trials.



Principal Investigator

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Development of a high-throughput drug screening device for brain cancer

Funding Requirement INR- 60L over 3 years

Objective

- 1. Develop an inexpensive and easy to use 3D microfluidic drug screening device that will mimic the environment of brain and hence will improve the testing efficiency of a potential drug and hence will expediate the process of drug discovery.
- 2. This device will be used to determine the most effective drug combination and dosage for personalized medicine.

Impact

Glioblastoma Multiforme (GBM) is a dreadful brain cancer with a life expectancy of mere 1-1.5 yrs. In 2020, according to WHO, India had 31,460 new cases of brain cancer, out of which 85% succumbed to death. While, many therapeutic techniques are being tried, mortality rate has not been improved for past 50 years for GBM. Hence, rapid drug discovery for GBM is urgently needed which needs an efficient drug testing, drug screening system.

Project Description

We propose to develop a high-throughput drug screening microfluidic device which will mimic the complex environment present in brain tumors and will estimate the efficacy of individual as well as combinatorial drugs used for treating Glioblastoma brain cancer (GBM). The device will have 100 micro-wells. We will create small tumor like 3D structures inside these nodes. Further, 100 different concentration combinations of one or more drugs will be created using advanced microfluidic technology.



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Development of efficient bioprocesses for the PEGylation of therapeutic proteins

Funding Requirement INR- 32L over 2 years

Objective

- 1. Genetic Engineering of E. coli for GCSF production
- 2. Large scale production of GCSF
- 3. Standardizing PEGylation reaction and scaling up.
- 4. In vitro assays and pharmacokinetics with available commercial therapeutic protein.

Impact

Recombinant protein therapeutics are applied in the treatment of several non-communicable disorders and ensuring their availability is necessary to reduce the disease burden in India. PEGylated form of Granulocyte colony stimulating factor (G-CSF, filgrastim) is used in the treatment of febrile neutropenia, seen in cancer patients undergoing chemotherapy. We plan to optimize and scale up the PEGylation process to improve the protein yield and reduce the cost of final therapeutic product.

Project Description

Construct a recombinant E.coli producing higher G-CSF involving a crucial step to develop a bioprocess yielding larger amounts of recombinant proteins (involve reactor studies and process modelling). After purifying recombinant G-CSF, site-specific PEGylation reaction conditions and catalyst optimization to achieve maximum conjugation in shorter time duration. The conjugated protein will be purified and checked for quality with other commercially ones. Activity assays and pharmacokinetic profile will also be part of the processing.



Principal Investigator

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FlowTechPharma: Prototype for manufacturing encapsulated droplets for topical delivery of API

Funding Requirement INR- 30L over 1.5 years

Objective

Developing a lab-scale prototype to implement a manufacturing technology for semi-solid drugs using a QbD (Quality by design) approach. The aim of the protype is to deliver a finer control over the process while reducing the process times, energy, utilities demand and batch-to-batch variation. Thinking forward, implementing this set-up, would reduce the time to bring new products into market and deliver a superior product at a relatively lower price.

Impact

Semi-solids (ointments, creams) are the most common topical drug delivery method and constitute $\sim 60\%$ of the dermatology therapeutic segment. Currently, these are manufactured using the one-pot mixing technology which provides a sub-optimal control over the process, but prone to non-uniformities, poor process control and longer run times. As a result, the eventual product experiences stability issues during its shelf-life

which is evident from the market recalls of creams and customer complains of texture issues.

Project Description

Our studies have identified key process parameters that can increase the stability (5X) of the semi-solids product while reducing the stabilizer concentration by a factor of 2. We are developing a prototype set-up that allows us to implement learning from semi-solid formulations created in "test-tube" to a scalable operation. The assembly line type design would be capable of manufacturing semi-solid topical dosage with exact amount of API, polar liquid and excipients, will de-risk manufacturing at larger scale and pave the way for quicker tech-transfer.



Principal Investigator

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ShapeDx: a high accuracy, point-of-care sickle cell test

Funding Requirement INR- 25L over 2 years

Objective

There is an unmet need for a point-of-care test that can distinguish between Sickle cell disease and Sickle cell trait

(a) Development of a commercial prototype [TRL 9] of the test, and

(b) Performing rigorous benchmarking against the gold standard with a large number (~ 400) of clinical samples.

Impact

Sickle cell anaemia is a hereditary blood disorder with no cure where red blood cells (RBC) become stiff and sickle-shaped. The afflicted individuals suffer from lifelong anaemia, recurring extreme pain, and eventual organ damage. Disadvantaged communities living in remote parts of India have disproportionately high incidences and mortality rates due to limited access to diagnosis and counselling.

Project Description

The gold standard test (HPLC) for distinguishing between Sickle cell disease and Sickle cell trait requires blood samples to be transported to centralised pathology laboratories, leading to an increase in diagnosis cost (~ INR 2500) and delaying treatment (by at least 48 hours). We have developed a POC solution, ShapeDx to address this problem that gives results within one hour and at 1/10th the cost (INR 250). The test has been performed in multiple field locations, often in remote areas.



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Wearable electrophysiology platform for neuro-diagnosis and monitoring

Funding Requirement INR- 1 Cr over 2 years

Objective

We propose a wearable device which can detect and monitor any variation in the brain signal and will be useful to diagnose any such neurological disorders. Such a device can overcome the delay in obtaining a diagnosis and the user can seek treatment promptly. The device will also be useful by neuro physicians as well as neurosurgeons. Apart from that, such a device would be very handy for academicians and research institutes for understanding the brain's function.

Impact

Electroencephalography (EEG) is one of the most important methods to monitor the electrical behaviours of the brain and to evaluate neurological disorders which is one of the important public health issues in India. A rough estimate show that in India over 40 million people having common neuro-disorders such as epilepsy, stroke, tumor, migraine, chronic pain, Parkinson's disease and tremors. The detection of neurological disorders is very difficult and costly, and therefore goes undiagnosed and hence untreated.

Project Description

A key challenge with EEG devices is their dependence on gel (wet) electrodes which improve signal integrity and stability. But they get dried out and cause inconvenience and discomfort. Electrode systems should not only be cost-effective but also simple to be able to be administered by non-experts. Further, the developed electrode system should be integrated with an interface and embedded electronics in an IoT enabled framework, to enable measurements of brain signals and thus make it possible to continuously monitor or diagnose.



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Wound dressings for Treating Diabetic Foot Ulcer

Funding Requirement INR- 45L 2 years

Objectives

- 1. Fabrication and characterization of bioactive gelatin/chitosan gels entrapped with NMase and caspase inhibitor
- 2. Safety and efficacy studies of wound dressings in diabetic rat model
- Successful completion of these studies will enable us to pursue clinical trials on human subjects.

Impact

Diabetic foot ulcers (DFU) remain a costly and disabling clinical problem, often resulting in a prolonged course of treatment and amputation of the limb in patients with diabetes. It is a major public health challenge of growing proportions and many of these end in foot/limb amputation. In India, ~60 million people are diabetic. Thus, there is an urgent need to come up with affordable ways for treating DFUs.

Project Description

Current treatments for diabetic wounds are aimed at containing the wounds and not healing them. Recently, we have identified an enzyme, neuraminidase (NMase). Using NMase we aim to develop bioactive wound dressings for treating DFUs which actively drive wound healing by inhibiting fibroblast death (caspase inhibitor) and enhancing fibroblast migration, proliferation and collagen deposition. The gelatin/chitosan hybrid gels wound dressings we developed are are adhesive and exhibit anti-bacterial activity.



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