

### Research Lab 03: CISAR; funded by DST-ECR, VGST-CISE and DST-INSPIRE

**Project 1:** The Vision Group on Science and Technology (VGST), Department of IT, BT and S&T has sanctioned a grant of **Rs. 30 lakhs** to the Department of Biochemistry, for the project “**Isolation of therapeutic cryptic peptides involved in blood pressure regulation from marine industry waste**”. The project is under the CISEE scheme where the grantee institution is permitted to set up a Center for Innovative Science and Research.

Interested students with an investigative aptitude and excellent track record are selected and trained in this research program run by the Center. These candidates get to have hands-on experience in several techniques useful including SDS-PAGE, FPLC, enzyme kinetics and analysis of biomarkers.

From the genesis of CISAR till date, in a span of two years the group has presented their work in several national and International level platforms including KSTA, IPS, UGC, EMSI and have **won Nine “Best paper” and six “Best Poster” awards.**

The group has published **four research papers** in peer reviewed international journals (*Journal of Food Processing and Preservation; International Journal of Engineering and Scientific Research, Turkish Journal of Biochemistry*) and three review papers in reputed national journals (*Current Science, International Journal of Life Sciences and Vigyan Prasar*)





## ***Project 2***

**Dr. Pradipta Banerjee** has been awarded a **DST-SERB** project of approximately **Rs. 35 lakhs** for the project “Isolation of matricryptic peptides from marine industry waste involved in nanocrystal hydroxyapatite formation and fabrication of a peptide based osseointegrative implant coating”

Project Fellow: Prakruti P Acharya

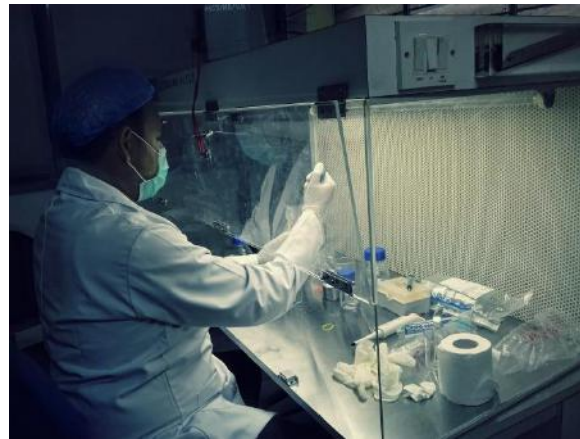
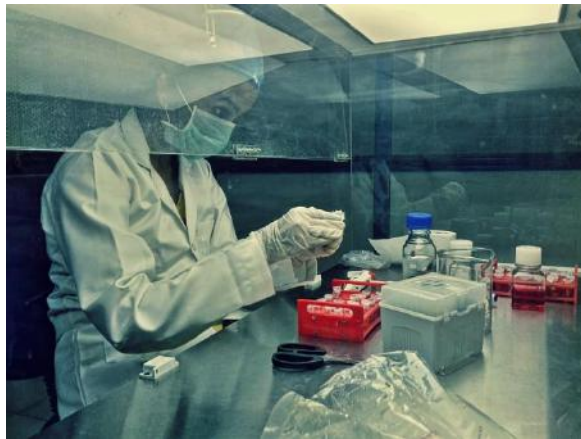
Clinical problems of bone defects are encountered in diverse disciplines, including orthopedics, dentistry and maxillofacial surgery. The need of the hour is to repair osseous deficiencies through osseointegration – using a coating or grafting material that allow osteoblast differentiation, is biocompatible enough to be absorbed by the body and replacable with new bone. Commonly used bone augmentation techniques used to repair osseous deficiencies suffer from their unique disadvantages; autograft harvesting can result in donor site morbidity while allograft and xenograft tissue is limited by donor availability along with an increased risk of immunogenic response, disease transmission and infection. The alternatives are synthetic ceramics, which suffer from a major disadvantage: bio-inertness. A comparatively in-expensive and promising technique for osseointegration and implant acceptance is the bio-mimetic approach, which mimics the in vivo synthesis of bone through in vitro mineralization of the extracellular protein, collagen.

This project has two objectives; the first one includes isolating collagen from marine industry waste, fragmentation and screening of the hydrolysates for bio-mimetic mineralization properties. The second objective involves testing the nanocomposite of cryptic peptide/HA for its osteoblast supporting abilities and implant acceptance rates via mammalian cell cultures and in vivo using mice model.

The project fellow, Ms Prakruti P Acharya has presented her work on multiple national and international platforms and has won three best oral presentation awards.



Research scholars, Majushree (INSPIRE fellow) and Prakruti (DST project fellow) working on Fast Protein Liquid Chromatography Unit bought through VGST project for isolation of cryptic peptides



Work has been initiated in the ATC for growth of osteoblasts



**Project 3:** Utilization of collagen cryptic peptides to fabricate bioactive bandages and ointments for 2<sup>nd</sup> and 3<sup>rd</sup> degree wound healing; funded by **DST INSPIRE**

Project fellow: Manjushree H K, INSPIRE fellow

Approximate amount: **Rs. 24 lakhs**

Second and third degree burn wound leads to complication which makes management of the burn wound a challenging task. These burns may cause compression of blood vessels leading to distal vascularity. Bacterial infiltration in deep tissues may lead to sepsis. Large amount of wound healing ointments used causes the agents to be absorbed from the skin into the circulation and lead to unwanted side effects. Since the phases are not synced and severe burns destroyed the existing melanocyte, often hypopigmentation is seen in deep burns.

A major problem is the unavailability of modern bioactive bandages and ointments to an overwhelming part of the population of India. Because of this, majority of second- and third-degree burns are left to heal on their own. However, this prolongs the resolution phase forcing the wound to heal slowly. Thus, it causes hypertrophic scarring and unusual distortions of skin.

Current Treatments available for burn wounds are in the form of bandages and ointments which are produced in other countries and have to be imported, making price and availability to the general populace a problem.

Our solution is to identify wound healing cryptic peptides from marine collagen and fabricate collagen peptide-based bio active bandages and ointments to treat secondary and full thickness burn wounds. Cryptic peptides from collagen are immunogenic, specific and can be easily isolable from protein-rich sources. The goal of this project is to ensure that such bandages/ ointments are made in a lower cost so that it is easily affordable to the entire population of India.

