

## **Department of Pharmaceutical Biotechnology**

Department of Pharmaceutical Biotechnology has focus on Nutraceuticals and Functional foods, this is in context with non-communicable diseases especially Osteoarthritis and Diabetes. The department has all the required expertise for most of the basic molecular biology techniques such as PCR, Gene cloning, Gene expression and characterization. The Real-Time PCR is the main stay activity helpful for elucidating the molecular mechanisms for biological activities. Besides, with help of IRSHA facilities; we have developed several primary cell lines and cell based anti-inflammatory assays.

### **Details of technology transferred/ developed**

#### **delta 15 Desaturase gene from flax transferred to MAHYCO Seeds Pvt Ltd for Transgenic Okra**

The delta 15 Desaturase gene is a very important gene in omega 3 biosynthetic pathway that can convert omega 6 linoleic acid to omega 3 alpha linolenic acid. This gene was isolated, and even codon-improved in my lab. Under a MOU and Material Transfer Agreement signed between IRSHA and MAHYCO, flax gene was transferred to MAHYCO for plant transformation work. We selected Okra (Bhindi) since the seeds are consumed along with the Okra capsule. Prior screening of different Okra varieties was carried out to ensure presence of Linolenic acid, which is the precursor of Delta 15 desaturase. Further, the gene constructs were developed in pCAMBIA vectors for transformation. Okra transformation was carried out at MAHYCO using their optimized transformation protocol. The transgenic Okra lines were screened to show improved levels of omega 3 ALA. Rights on this Okra are shared with MAHYCO.

#### **Yeast consortium for *Asava-Arishta* (Ayurvedic product) fermentation**

*Asava* and *Arishta* are well-known traditional fermentation products. Traditional Ayurvedic fermentation is carried out by using flowers of *Woodfordia fruticosa* (*Dhayti*) or *Madhuka latifolia* (*MAhuva*) flowers. Understanding these flowers as source of wild yeast, we attempted isolation of yeast from these flowers. Six different yeast isolates were obtained and fully characterized for their fermentation abilities as well as rRNA sequencing. Ashvagandharishta was prepared using consortium of these yeast cultures and tested for its bioactivities on liver toxicity model. The advantage is the entire fermentation process was completed in 7 days as compared with 70 days in traditional fermentation. Additionally, contamination possibility was completely eliminated which can cause loss of batches on industrial scale. These cultures and the entire technology is available for transfer. Several discussions were held with *Asava/Arishta* producers including Baidyanath, but it did not click yet. I believe this is a good technology, useful for different types of Ayurvedic fermentation.

#### **Cell based assays for screening anti-inflammatory activity**

Since inflammation is a basic pathophysiology in many diseases a lot of drugs are screened for their anti-inflammatory activity. Lot of animal models are used for this screening. We have optimized cell-based assays for anti-inflammatory screening. A panel of genes has been optimized in these assays, which can elaborate the mechanism of action of the test compounds. Tox-India, a toxicology testing company has shown keen interest in this assay system. Soon, MOU will be finalized with this company for technology transfer.

### **Consultancy work**

#### **Indus Biotech: Wound healing action of their lead molecule:**

Indus Biotech Pvt limited is an innovative drug discovery company focused on developing solutions for the long term sustained management of diseases. The company has isolated several bioactive molecules from plants. One of their lead molecules has shown wound healing activity as shown in rat skin wound healing model. However, to file US patent its mechanism of action was required. In a consultancy project with Indus Biotech, I helped them to analyze expression of four different growth factors namely, Epithelial growth factor (EGF), Transforming Growth Factor (TGF- $\beta$ ), Insulin like Growth factor (ILGF) and Fibroblast Growth Factor (FGF). I demonstrated that EGF and TGF- $\beta$  are expressed in wound tissue in a dose dependent manner with their compound leading to early closure of wound. IRSHA received 3 lacks Rs for this consultancy work.

#### **TATA chemicals Pvt Ltd: Anti-inflammatory action of molecular complexes**

The team at TATA chemicals developed molecular complexes of natural products from green tea with improved solubility and bioactivity. Anti-inflammatory activity of their product was established using HepG2 cell line. Along with biochemical assays anti-inflammatory genes were studied to screen their compounds generated using various proportions. IRSHA received 5 lacks Rs for this consultancy.

#### **RMIT University, Melbourne Australia: Honey formulations**

The RMIT University, Melbourne Australia has developed honey formulations targeting many health benefits. The pharmacology expertise at Poona College of Pharmacy coupled with the mechanistic investigation including gene expression assays attracted a consultancy project which will be carried out in 2019. Poona College of Pharmacy received 7.5 lacks for this consultancy.