

## CANCER BIOLOGY

Cancer is the leading cause of death in both economically developed and developing countries. It is a fatal disease caused by an uncontrolled division of abnormal cells in the body. These abnormal cells called malignant cells which can invade nearby tissues can spread through bloodstream and lymphatic system to other parts of the body. Tunicamycin is an antibiotic isolated from *Streptomyces lysosuperificus* that inhibits the synthesis dolichyl-N-acetylglucosamine diphosphatase essential for the assembly of oligosaccharide chains and their subsequent transfer to asparagine residues in proteins. The epidermal growth factor receptor (EGFR) is the cell-surface receptor, it's over expression or over activity has been associated with a number of cancers, including breast, lung, ovarian, and anal cancers. EGFR, an N-glycosylated transmembrane protein used to study whether inhibition of N-glycosylation and stimulation of endoplasmic reticulum (ER) stress by Tunicamycin enhances growth inhibition in cancer cell line. The protein-ligand (EGFR and Tunicamycin) and the inhibitor is Aldose reductase. The structure prediction was done using 3D pymol and maestro analysis. The structure of the ligand is elucidated and it was docked with EGFR active pocket site. The docking score was  $-9.87$  kcal/mol and gliding energy was  $-69.17$  kcal/mol. In conclusion the structural details and docking interaction predicts that this model can be used for drug target delivery in cancer. It also anticipated that the findings may provide useful information or clue for designing effective drugs for the therapeutic treatment of EGFR-related cancer.

The study was made to evaluate the antiproliferative effect of chitosan extracted from crab shells against human lung adenocarcinoma cell line (A549). Chitosan was extracted from crab shells which includes deproteinization, demineralization, deacetylation. MTT method to find out the toxicity and cell viability of chitosan in both normal and cancer cells (A549). The Propidium iodide staining and DNA fragmentation is to analyze the apoptotic bodies in A549 cell line. Chitosan appeared creamy white in colour and the total carbohydrate content was estimated as 0.07 mg/ml. The antiproliferative effect of chitosan against A549 cells clearly emphasizes, that there is a decrease in the cell viability. The 50 % inhibition (IC<sub>50</sub>) of the cell growth was found at 20  $\mu$ g/ml. The cytolocalization of nuclear morphology and DNA fragmentation assay revealed the induction of apoptotic cell death in A549

at 24 hours. Chitosan exhibits the inhibitory effect by inducing loss of cell viability, morphology change and DNA fragmentation in A549 cells due to the presence of free protonated amino groups on the polymer chain. Our preliminary studies support that chitosan could be an efficient therapeutic agent for cancer.

## PHARMACOLOGY

Apoptosis is a physiological process that entails the programmed death of the cells. Although apoptosis has a functional role in normal development and tissue homeostasis, aberrant triggering of the process by toxicants may lead to abnormal function or disease. Bcl-2 was the first member to be identified of a growing family of genes that regulates cell death in either positive or a negative fashion. Members of the Bcl-2 family of proteins play a major role in governing this mitochondria-dependent apoptotic pathway, with proteins such as bax functioning as inducers, and proteins such as Bcl-2 as suppressors of cell death. The present study was aimed to investigate the mRNA expression of pro-apoptotic proteins like Bid, Bad, Bax and anti apoptotic protein Bcl2 in ventral prostate of infected rats were studied.

The inhibition of  $\alpha$ -amylase enzyme involved in the digestion of carbohydrates can significantly reduce the post prandial hyperglycemia. The bioactive compound, 11 methoxy-2-methyltridecane- 4-ol extracted from marine macro alga *Gracilaria edulis* showed antidiabetic activity. In the present study, *in silico* pharmacokinetics and molecular interaction properties of novel bioactive compound 11-methoxy-2- methyltridecane-4-ol for inhibiting  $\alpha$ -amylase enzyme activity in carbohydrates digestion is investigated and reported. The ADME properties of bioactive compound and its absorption such as solubility, Caco-2 permeability intestinal absorption, skin permeability were evaluated.

*Pedaliium murex L.* is a medicinal herb that has been used for the treatment of diseases related to kidney in the traditional system of medicine. The current study aims to study the effect of ethyl acetate extract of *P. murex* (EAEP) and its fractionated compound pedalitin against urease production and UreC gene expression in *Proteus mirabilis*. The selected reference strain *Proteus mirabilis* (MTCC 425) and the isolates culture of *Proteus mirabilis* were subjected to study the antibacterial efficacy of *P. murex*. Expression analysis of *P. mirabilis* urease gene was successfully done by QPCR. The ethyl acetate extract effectively inhibit the reference *Proteus mirabilis* and bacterial isolates of *Proteus mirabilis* in the clinical samples studied. EAEP has showed more potent activity (56.7%) against urease enzyme and pedalitin also exhibited potent activity (30.1%). Using qPCR, the expression of UreC gene of

*P. mirabilis* was controlled by EAEP and also its bioactive compound pedalitin. The present study clearly demonstrated the potency of *P. murex* in controlling the growth of pathogenic *P. mirabilis* and to control the expression of urease enzyme production as well as to restrict the urease gene expression in *P. mirabilis*

## ENVIRONMENTAL BIOLOGY

Plastic is a broad name given to different polymers having high molecular weight and that can be degraded by various processes. However, degradation by physical and chemical means leads to innumerable environmental hazards. On the other hand, degradation of plastics by microorganisms seems to be more effective, considering their abundance in the environment, their specificity in attacking plastics and has very less environmental hazards. Plastic and polythene waste accumulating in the environment are posing an ever increasing ecological threat. Municipal solid waste contains high amounts of cellulose, which is an ideal organic waste for the growth of most of microorganism as well as composting by potential microbes.

Polyethylene waste accumulating in the environment poses an ever increasing ecological threat. They are usually a polymer of ethylene which forms an essential part in our everyday life. They are used in various sectors for wide applications such as packaging materials as films or sheets, as insulators or as consumer products and others. There is an increasing demand for these polymers; with almost 500 billion to 1 trillion tonnes have been used routinely worldwide. They consist of high molecular hydrocarbons with complex structures which can't be degraded easily and their disposals have aroused a great environmental threat. It takes nearly about thousand years for efficient decomposition of these polymers in nature. Widespread studies on biodegradation of plastics have been carried out to overcome the environmental problem associated with these synthetic plastic wastes. This review focus on recent findings on the isolation of synthetic polymer degrading bacterium from soil, the discovery of new degrading enzymes and the cloning of genes for biodegradation. The soil bacteria release the extracellular enzymes such as lignin peroxidase, manganese peroxides to degrade the polythene but the thorough characterization of these enzymes in relation to polythene degradation is still needed to be carried out. In addition, efficient polythene degrading soil bacteria need to be screened from various sources.

As oil runs out and the use of fossil fuels becomes progressively more expensive, it's a necessity to replace the sources of raw material for the manufacture of vital plastics. In addition, the use of carbon-based sources of energy for use in

plastics manufacturing evolve greenhouse gases to the atmosphere impeding the world's attempts to avoid CO<sub>2</sub> emissions. Currently, solid waste management and global warming are the great challenge to the world. Bioplastics, the plastics derived from renewable biomass sources, are one of the alternatives to avoid more dangerous tribulations. Environment protection and sustainable product development has attracted a lot of attention in the last few years, and there has been extensive research looking at ways to provide material needs using energy efficient, non-toxic and renewable sources. Nowadays many countries are aware of usage and production of bioplastics. This communication is intended to project the status of bioplastics in worldwide market and especially in India



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