Faculty Interest and Capability

Name: **Dr. Ashok Jain**
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Discipline: Biology
Subdiscipline(s): Cell and Molecular Biology, Cell signaling, Biotechnology
Areas of Research Interests: Breast Cancer
Skills:

- DNA Microarray and global gene expression
- Mammalian cell culture, development of transgenic cell lines using Adenovirus based transfection techniques
- Molecular genetic techniques for DNA delivery: Electroporation, Microprojectile bombardment and *Agrobacterium* mediated gene delivery.
- Southern, northern and western blot analysis; Genomic DNA and cDNA library construction and screening
- DNA Manipulation including cloning, construction of plasmids for bacterial, plant and mammalian cell expression
- DNA sequencing, Polymerase Chain Reaction (PCR) techniques and Site Directed Mutagenesis
- Differential Display Reverse Transcriptase PCR (DDRT PCR)
- In vitro transcription mapping, Lysate ribonuclease protection assay (RPA)
- Plant tissue culture: in vitro techniques for embryogenesis and organogenesis.
- GUS enzyme assay, Cytological and Histological techniques
- Bioinformatics: Primer design (Oligo – software and other database), Image analysis of southern and northern (Fuji BAS 2000 Bio Image Analyzer); DNA Star and GCG Sequence analysis package; Gene works and NCBI gene bank program etc.

Research Summary *(current, performed in the past 5 year; 300 words or less)*

The prevention of cancer through diet is categorized as one of the most effective way to prevent cancer. Few studies have demonstrated the association of elevated risk of breast cancer and high consumption of the well-done meat. This correlation between increased cancer risk and meat preparation is most likely due to the production of high levels of heterocyclic amines (HCA). There are at least a dozen different HCAs are produced in meat cooked at high temperature. Amino-1-methyl-6-phenylimidazo[4, 5-b]pyridine (PhIP) is the most abundantly found HCA in the human diet. Previous studies have shown that PhIP can induce tumors in has prostate, colon and breast cells. N-hydroxy derivatives are formed by the oxidation of PhIP by cytochrome P-450 1A2 (CYP1A2). Acetylation or Sulphation of these derivatives results in the formation of a free radical. These changes leads to the formation of adduct that leads to mutation/s. Therefore, my research focuses on screening the antioxidant and ant-

carcinogenic compound found naturally in food (fruits, vegetables and spices) that can prevent the genotoxic effects of HCAs. We have developed an *in vitro* model to test the synergetic effects of PhIP and antioxidants. The cell response is characterized based on cell proliferation assay, comet assay, ROS inhibition, cell cycle and apoptosis analysis, anti DNA adduct analysis. In addition we are studying the signaling pattern using RT PCR and western blot techniques. We have screened a dozen different phytochemicals to validate the effectiveness of preventing cytotoxic and genotoxic effect of PhIP.

Keywords *(5 maximum)* Breast cancer, Heterocyclic amines, antioxidant, DNA adduct, Phytochemicals