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free radicals may be through the enzyme catalysed reactions or through transferance of electrons from redox cycling chemicals to oxygen. Detection of these species in biological system is a difficult task but helps in elucidating mechanism of chemical toxicity and also in devising various approaches to combat toxic injury. The definition of oxidative mechanism of toxicity or disease progression allows use of antioxidants for the interception of tissue damage at an appropriate time. It may under certain conditions, reverse the toxic effect. Prophylactic use of such agents may help in the dimunition of toxic injury. The usefulness of oxidative injury in medicine is another important aspect which need to be considered in detail. Examples of various model compounds/drugs manifesting their toxicity through the free radical mechanisms will be discussed.

IL-7

STUDY ON SUB-LETHAL TOXICITY AND GENE REGULATION USING GLUTAMINE SYNTHATASE AS MODEL

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The environmental pollutants are one of the most potent agents for neurological disorders as tumor promoters and teratogens. The molecular mechanisms responsible for the biological activity, however, remain largely unknown. In the present study glutamine synthatase (GS) was chosen as a model. GS maintains the ammonia level in liver, kidney and astrocytes in the central nervous system. This is a highly regulated enzyme at transcription level and shows differential regulation between liver and astrocytes. The GS transcript levels are also regulated by oncogene products. The study shows the relationship of sub-lethal toxic effects of acrylamide, a known neurotoxin at various transcription factor levels.

IL-8

MICROBIAL DEGRADATION OF XENOBIOTIC COMPOUNDS - A REVIEW OF THE WORK DONE IN OUR LABORATORY

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The work done on the microbial degradation of various xenobiotic compounds such as monochlorobenzoates, phenolics, 2,4,5-trichlorophenoxy acetic acid, and hexachlorocyclohexane isomers during the last 4 years are briefly reviewed. A Pseudomonas aeruginosa strain 3mT capable of degrading high levels of 3-chlorobenzoate (3-CBA, 8 g/L) and 4-chlorobenzoate (4-CBA, 12 g/L) was isolated and studied in detail. This strain degraded 3-CBA and 4-CBA through the formation of the respective chlorocatechols as intermediates which were cleaved via ortho-mode and further mineralized. Various growth and degradation kinetics of this organism

was studied. The involvement of a resident plasmid in the catabolic process was also studied. Both 3-CBA and 4-CBA were found to inhibit germination of seeds of tomato and brinjal. The inhibitory effect could be eliminated from the soil by treating the soil with P. aeruginosa cells. Similarly, the inhibition of germination by 2,4,5-T was prevented by inoculating the soil with P. capacia AC1100 strain.

A number of Pseudomonas strains designated as CP4, PC1, SPC-2, CoPC-3, CoPC4 and SoPC-5 capable of degrading phenol, cresols, cresote, xylenols and other aromatic compounds were isolated and characterised. Pseudomonas sp. CP4 was able to utilise upto 1.5 g/L of phenol as a sole source of carbon and energy. This is the highest phenol concentration reported that a bacterium can utilise. All the strains followed a meta-pathway for the degradation of phenol whereas P. stutzeri strain SCP-2 degraded phenol through ortho-pathway which is rare among bacteria.

Simultaneous degradation of chlorobenzoates and phenol by a mixed culture of the ortho-pathway following strain P. aeruginosa 3mT and the meta-cleaving strain Pseudomonas sp. P4 were achieved effectively which generally are not possible due to their metabolic incompatibility.

Microbial consortia that can degrade fairly high levels of α-, ß-, γ- and δ-isomers of hexachlorocyclohexane (HCH) were developed by long-term enrichment techniques. Consortia AHR degraded upto 50 ppm of -HCH with concomitant release of stoichiometric amounts of chloride. Similarly consortia GHR, BHR and DHR degraded γ-(25 ppm), ß-(10 ppm) and α-(10 ppm) isomers of HCH, respectively. Effect of temperature, pH and auxiliary carbon sources on the degradation of HCH was studied.

IL-9

DEGRADATION OF XENOBIOTICS : A BIOTECHNOLOGICAL APPROACH

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Amongst the variety of Xenobiotics, chlorinated hydrocarbons have shown a lot of promise firstly because of their use as a pest control measure and secondly as a pollutant because of their reclacitrant natural, tendency to persist and bioaccumulation in the nature ecosystem. However, a number of microbial species have evolved the enzyme system to degrade, detoxify organochlorinated compounds. In this laboratory strains of Pseudomonas, namely Pseudomonas putida, P. convexa, P. pickettii and Pseudomonas sp. capable of degrading 2 CBA, 3-CBA, 4-CBA and 2,4-DCBA as sole source of carbon and energy have been identified and characterised. Ultraviolet absorption scanning of cell free supernatants revealed that degradative pathways involved open ring compounds and dihydroxy derivatives of the substrate. Mitomycin 'C' curing and NG mutagenesis of P. putida P_1 revealed that 3 CBA degradative trait is not linked with auxotrophy markers. Conjugal transfer frequencies for auxotrophic markers and CBA trait were