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Screening of novel phytonutrient/s capable of reverting the PhIP induced genotoxicity in breast epithelial cells

The 2-amino-1-methyl-6-phenylimidazo [4-5-b] pyridine (PhIP) is mutagenic and carcinogenic heterocyclic amine, formed during the cooking of meat. The metabolism and mutational effects of PhIP are well defined. We hypothesized that the right combination of antioxidants (naturally present in fruits, vegetables and spices) along with grilled meat can suppress the PhIP induced genotoxicity. Therefore, a model system using human breast epithelial cells (MCF 10A) was developed to test various antioxidants in presence or absence of PhIP. We have tested four vitamin (C, K3, D3, and E), gingerol (6 and 10), N-acetyl cysteine, glutathione and curcumin at varying concentrations. The protective effects of these compounds were evaluated using cell viability assay and comet assay to quantify the DNA damage by measuring the olive tail moment (OLM). Cell viability data along with OLM was used to quantify the protective effects of these phytochemicals. Based on the protective effect, the phytochemicals were grouped into four categories: highly effective, quite effective, moderately effective and least effective. Results indicate that presence of these compounds protect cells from cell death and DNA damage as compared to cells that were treated only with PhIP. Vitamin K3 and 6-Gingerol were least effective; 10-gingerol and lycopene were moderately effective; other phytochemicals were quite effective except curcumin which was highly effective. To understand how curcumin protect cells from PhIP genotoxicity we further used DCF assay to quantify ROS production and immunofluorescence method for DNA adduct formation. Curcumin co-treated cells showed significant differences and PhIP induced cell cytotoxicity was consistently reverted to normal. Gene expression analysis using RT PCR technique indicates that curcumin interact via multi molecular targets. Hence the present study suggests that curcumin is a promising natural compound to revert the effect of PhIP induced cell genotoxicity.

Biography

Ashok Jain has completed his PhD from Agra University, India. He was a Visiting Scientist at Texas A&M University. Currently he is a Professor at Albany State University, GA and Program Coordinator for Biotechnology Program. He has received research funding from NIH, DOD and USDA. He has served as the Director of the Center for Undergraduate Research and is currently serving as MARC U*STAR Project Director. He has published more than 25 papers in reputed journals and has been serving as Reviewer for six journals of international repute.

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