Exploration of Therapeutic Efficacy of Diet-derived Antioxidants in Reducing Arsenic-induced Hepatotoxicity

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Arsenic contamination of groundwater is a high profile problem in different parts of the world. Specifically in several regions of West Bengal the levels of arsenic in ground water is higher than the permissible range. The current study was undertaken to evaluate the effect of diet-derived antioxidants on arsenic induced hepatotoxicity in mice and development of hepatoprotective/restorative compounds. The doses of arsenic selected for this study are relevant to the amount of arsenic detectable in the ground water sources of West Bengal. Results of the present investigation shows, treatment of arsenic at environmentally relevant doses cause hepatotoxicity in experimental animals, which is confirmed by the elevated levels of liver injury markers. Convincing data obtained from the present study indicate that arsenic induces the generation of reactive oxygen species in the liver cells. This alters the redox status in the cell leading to oxidative stress. Treatment with pomegranate fruit extract successfully ameliorates arsenic-induced toxicities by modulating the activation of NF-kB and Nrf2 and enhancing the activities of anti-oxidant enzymes and restoring the balance of Bax-Bcl2. This raises the possibility of using pomegranate as an antidote for arsenic poisoning. The animal model of arsenic toxicity that has been developed using male Swiss albino mice showed consistent results which enabled us to quantify the effects of arsenic toxicity on liver cellular structures and enzymatic activities as well protein expression patterns. The data obtained in the first phase of the study are relevant to the hypothesis that diet-derived polyphenols might play a protective role against arsenic-induced hepatotoxicity. Moreover these data provide a functional map to test the extent of protective activities for the other test compounds.

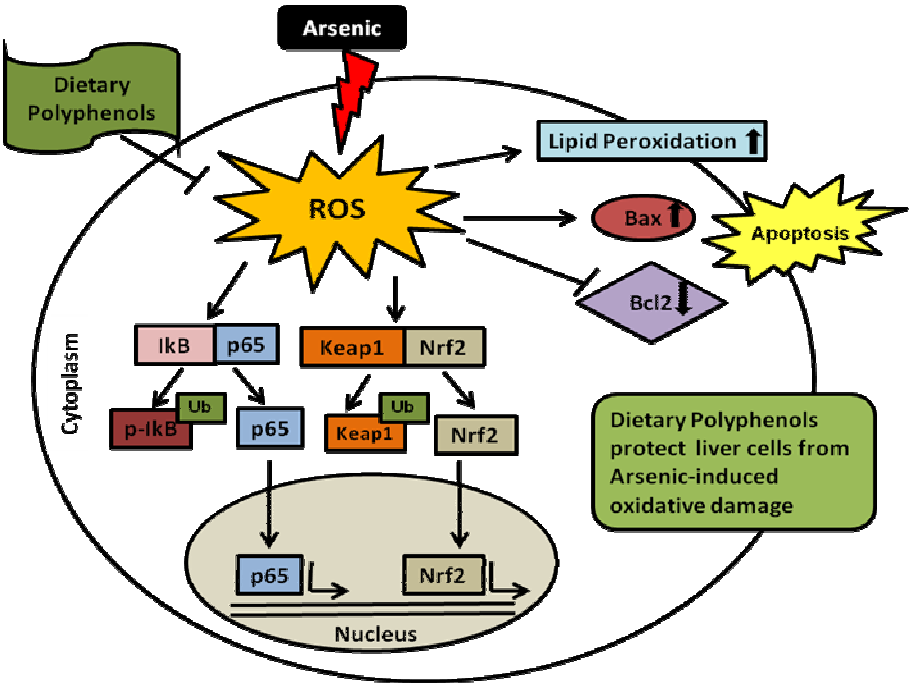

Figure: Schematic Representation: Reversal of Arsenic-induced liver cell damage by dietary polyphenols (PFE)