



Identification of the Multifaceted Chemopreventive Activity of Curcumin Against the Carcinogenic Potential of the Food Additive, KBrO_3

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Abstract

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Supplementary Data

Background: Potassium bromate (KBrO_3), a food additive, has been used in many bakery products as an oxidizing agent. It has been shown to induce renal cancer in many in-vitro and in-vivo experimental models.

Objectives: This study evaluated the carcinogenic potential of potassium bromate (KBrO_3) and the chemopreventive mechanisms of the anti-oxidant and anti-inflammatory phytochemical, curcumin against KBrO_3 -induced carcinogenicity.

Method: Lactate dehydrogenase (LDH) cytotoxicity assay and morphological characteristics were used to assess curcumin's cytoprotective potential against KBrO_3 toxicity. To assess the chemopreventive potential of curcumin against KBrO_3 -induced oxidative insult, intracellular H_2O_2 and the nuclear concentration of the DNA adduct 8-OHdG were measured. PCR array, qRT-PCR, and western blot analysis were used to identify dysregulated genes by KBrO_3 exposure. Furthermore, immunofluorescence was used to evaluate the ciliary loss and the disturbance of cellular tight junction induced by KBrO_3 .

Results: Oxidative stress assays showed that KBrO_3 increased the levels of intracellular H_2O_2 and the DNA adduct 8-OHdG. Combination of curcumin with KBrO_3 efficiently reduced the level of H_2O_2 and 8-OHdG while upregulating the expression of catalase. PCR array, qRT-PCR, and western blot analysis revealed that KBrO_3 dysregulated multiple genes involved in inflammation, proliferation, and apoptosis, namely CTGF, IL-1, and TRAF3. Moreover, qRT-PCR and immunofluorescence studies showed that KBrO_3 negatively affected the tight junctional protein (ZO-1) and induced a degeneration of primary ciliary proteins. The negative impact of KBrO_3 on cilia was markedly repressed by curcumin.

Conclusion: Curcumin could potentially be used as a protective agent against carcinogenicity of KBrO_3 .

Keywords: Potassium bromate (KBrO_3); chemoprevention; curcumin; inflammation; kidney cancer; primary cilia