

□ Identification of the Multifaceted Chemopreventive Activity of Curcumin Against the Carcinogenic Potential of the Food Additive, KBrO₃

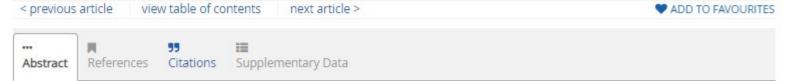


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Background: Potassium bromate (KBrO3), a food additive, has been used in many bakery products as an oxidizing agent. It has been shown to induce renal cancer in many in-vitro and in-vivo experimental models.

Objectives: This study evaluated the carcinogenic potential of potassium bromate (KBrO3) and the chemopreventive mechanisms of the anti-oxidant and anti-inflammatory phytochemical, curcumin against KBrO3-induced carcinogenicity.

Method: Lactate dehydrogenase (LDH) cytotoxicity assay and morphological characteristics were used to assess curcumin's cytoprotective potential against KBrO3 toxicity. To assess the chemopreventive potential of curcumin against KBrO3-induced oxidative insult, intracellular H2O2 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 KBrO3 exposure. Furthermore, immunofluorescence was used to evaluate the ciliary loss and the disturbance of cellular tight junction induced by KBrO3.

Results: Oxidative stress assays showed that KBrO3 increased the levels of intracellular H2O2 and the DNA adduct 8-OHdG. Combination of curcumin with KBrO3 efficiently reduced the level of H2O2 and 8-OHdG while upregulating the expression of catalase. PCR array, qRT-PCR, and western blot analysis revealed that KBrO3 dysregulated multiple genes involved in inflammation, proliferation, and apoptosis, namely CTGF, IL-1, and TRAF3. Moreover, qRT-PCR and immunofluorescence studies showed that KBrO3 negatively affected the tight junctional protein (ZO-1) and induced a degeneration of primary ciliary proteins. The negative impact of KBrO3 on cilia was markedly repressed by curcumin.

Conclusion: Curcumin could potentially be used as a protective agent against carcinogenicity of KBrO3.