Cucurbitacin D ameliorates benzo[a]pyrene induced liver injury *via* Activation of Nrf2 Antioxidant pathway

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Abstract

Background: Co-morbidity variables, such as smoking, are strongly linked to the development and progression of liver cancer. Further, benzo[a]pyrene, a major component of tobacco smoke, is highly carcinogenic and triggers liver damage. Cucurbitacin, a kind of triterpene, has a wide range of biological properties, including antioxidant, anti-inflammatory, and anti-cancer effects. However, the precise mechanism of its hepatoprotective effects is obscure.

Objective: The aim of this study is to investigate the cytoprotective effects of novel analog of cucurbitacin, cucurbitacin D, against benzo[a]pyrene-induced liver injury in HepG2 cells.

Method: The cytoprotective efficacy of cucurbitacin D against benzo[a]pyrene-induced liver damage was studied using proliferation, clonogenicity, migration, invasion, Western blotting, and qPCR analysis. The levels of intracellular reactive oxygen species (ROS) in liver cells was measured using the DCFDA assay.

Results: In human HepG2 cells, functional experiments revealed that cucurbitacin D has cytoprotective effects against dose-dependent growth inhibition by benzo[a]pyrene. The mitigation of ROS observed by fluorimeter and fluorescence microscopy suggested that this protective effect was likely due to cucurbitacin D's antioxidant property. Additional research is ongoing to identify the effect of cucurbitacin D on oxidative stress markers by using qPCR and western blotting techniques. Overall, these findings showed that cucurbitacin D diminishes benzo[a]pyrene-induced liver injury via its antioxidant activity.

Conclusion: These findings show that cucurbitacin D has hepatoprotective properties against benzo[a]pyrene-induced liver injury, making it an attractive food supplement ingredient.