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EFFECTS OF CATECHIN ON MENADIONE-INDUCED CYTOTOXICITY

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ABSTRACT

The main objective of this study was to investigate the cytoprotective effects of catechin in menadione-induced cytotoxicity in both WRL 68 and Hep G2 cell lines. In order to achieve those objectives, the dose response relationships of menadione and catechin concentrations and their cytotoxic effects in each of the cell types were first explored. This allowed the determination of the median inhibitory concentration (IC_{50}) for menadione and catechin. In order to assess cytoprotective effects of catechin, cells were then treated with menadione and catechin concomitantly for 24 h, after which cell viability was measured by the MTS assay. The IC_{50} values for menadione in WRL 68 and Hep G2 cell lines were 31.62±0.42μM and 31.62±0.86μM, respectively. IC_{50} values for catechin in WRL 68 and Hep G2 cell lines were 223.87±7.66 μM and 199.52±14.05 μM, respectively. In the cytoprotective studies, neither menadione (15μM and 30 μM) nor catechin (30μM and 50μM) elicited a significant decrease in cell viability in WRL 68 cells. Thus, no cytoprotective effects by catechin against menadione induced cytotoxicity could be proven. A similar study in Hep G2 cells showed menadione (15μM and 30μM) to elicit a significant decrease in cell viability compared to controls while catechin (30μM and 50μM) was without affect. Concomitant administration of menadione and catechin failed to show protection of Hep G2 cells against menadione's cytotoxicity by catechin. In summary, dose-response relationships for the cytotoxicity of menadione and catechin were obtained in WRl 68 and Hep G2 cells. Catechin (30μM and 50μM) failed to show cytoprotection of these cell lines against menadione's (15μM and 30μM) cytotoxicity.

Keywords: WRL68 ; HEPG2 ; menadione ; cytotoxicity ; catechin ; cytoprotective.

CHAPTER 1

INTRODUCTION

Cells are the smallest unit of living things. It is the basic structural and functional unit of living organisms. The activity of an organism depends on both the individual and the collective activities of its cells (Marieb, 2004).

Cell death, as it physiologically occurs at a pace of several million events per second in the healthy human adult is nonimmunogenic (Obeid *et al.*, 2007). Cells die through either of two distinct processes: necrosis or apoptosis. Morphological characteristics of necrosis include swelling and rapid cell degradation, disruption and loss of plasma membrane integrity, accompanied by extensive cytoplasmic vacuolation (Joseph *et al.*, 2004). The term "programmed cell death" is commonly used synonymously with apoptosis (Vaux, 1999). Morphologically, apoptosis involves loss of cell-cell contact, cytoplasmic shrinkage and pyknosis followed by karyorrhexis (Hooser, 2000). Presence of chemicals that can cause oxidative stress at higher concentrations can cause cell necrosis while its presence at lower concentration may cause apoptosis (Vaux, 1999).

Menadione is an important chemical in that it is used as a model compound to induce oxidative stress (Thort *et al.*, 1982). The cytotoxic effects of menadione are thought to be mediated through its one-electron reduction to semiquinone radicals, which