Functional Foods in Health and Disease **2013; 3(3):66-79**

Research Article **Open Access**

Activation of the intrinsic-apoptotic pathway in LNCaP prostate cancer cells by genistein- topotecan combination treatments

Vanessa Hörmann[1*], Sivanesan Dhandayuthapani[2], James Kumi-Diaka[1] and Appu Rathinavelu[2]

[1]Department of Biological Sciences, Florida Atlantic University, Davie FL 33314, USA; [2]Rumbaugh Goodwin Institute for Cancer Research, Nova Southeastern University, Plantation FL, 33322, USA

Corresponding author: Vanessa Hörmann: 3200 College Av., Davie, FL 33314, USA

Submission date: February 19, 2013; Acceptance date: March 29, 2013; Publication date: March 30, 2013

ABSTRACT

Background: Prostate cancer is the second most common cancer in American men. The development of alternative preventative and/or treatment options utilizing a combination of phytochemicals and chemotherapeutic drugs could be an attractive alternative compared to conventional carcinoma treatments. Genistein isoflavone is the primary dietary phytochemical found in soy and has demonstrated anti-tumor activities in LNCaP prostate cancer cells. Topotecan Hydrochloride (Hycamtin) is an FDA-approved chemotherapy for secondary treatment of lung, ovarian and cervical cancers. The purpose of this study was to detail the potential activation of the intrinsic apoptotic pathway in LNCaP prostate cancer cells through genistein-topotecan combination treatments.

Methods: LNCaP cells were cultured in complete RPMI medium in a monolayer (70-80% confluency) at 37ºC and 5% CO_2. Treatment consisted of single and combination groups of genistein and topotecan for 24 hours. The treated cells were assayed for i) growth inhibition through trypan blue exclusion assay and microphotography , ii) classification of cellular death through acridine/ ethidium bromide fluorescent staining, and iii) activation of the intrinsic apoptotic pathway through Jc-1: mitochondrial membrane potential assay, cytochrome c release and Bcl-2 protein expression.

Results: The overall data indicated that genistein-topotecan combination was significantly more efficacious in reducing the prostate carcinoma's viability compared to the single treatment options. In all treatment groups, cell death occurred primarily through the activation of the intrinsic apoptotic pathway.

Conclusion: The combination of topotecan and genistein has the potential to lead to treatment options with equal therapeutic efficiency as traditional chemo- and radiation therapies, but lower cell cytotoxicity and fewer side effects in patients.

Key words: topotecan; genistein; intrinsic apoptotic cell death