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◀ [ 1 ] ▶

**Record 1 of 1**

**Title:** Effects of Crude Extracts from Medicinal Herbs *Rhazya stricta* and *Zingiber officinale* on Growth and Proliferation of Human Brain Cancer Cell Line In Vitro

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**Source:** BIOMED RESEARCH INTERNATIONAL **Article Number:** 260210 **DOI:** 10.1155/2014/260210 **Published:** 2014

**Times Cited in Web of Science Core Collection:** 2

**Total Times Cited:** 2

**Usage Count (Last 180 days):** 0

**Usage Count (Since 2013):** 8

**Cited Reference Count:** 61

**Abstract:** Hitherto, limited clinical impact has been achieved in the treatment of glioblastoma (GBMs). Although phytochemicals found in medicinal herbs can provide mankind with new therapeutic remedies, single agent intervention has failed to bring the expected outcome in clinical trials. Therefore, combinations of several agents at once are gaining increasing attractiveness. In the present study, we investigated the effects of crude alkaloid (CAERS) and flavonoid (CFEZO) extracts prepared from medicinal herbs, *Rhazya stricta* and *Zingiber officinale*, respectively, on the growth of human GBM cell line, U251. *R. stricta* and *Z. officinale* are traditionally used in folkloric medicine and have antioxidant, anticarcinogenic, and free radical scavenging properties. Combination of CAERS and CFEZO treatments synergistically suppressed proliferation and colony formation and effectively induced morphological and biochemical features of apoptosis in U251 cells. Apoptosis induction was mediated by release of mitochondrial cytochrome c, increased Bax : Bcl-2 ratio, enhanced activities of caspase-3 and -9, and PARP-1 cleavage. CAERS and CFEZO treatments decreased expression levels of nuclear NF-kappa Bp65, survivin, XIAP, and cyclin D1 and increased expression level of p53, p21, and Noxa. These results suggest that combination of CAERS and CFEZO provides a useful foundation for studying and developing novel chemotherapeutic agents for the treatment of GBM.

**Accession Number:** WOS:000340124600001

**Language:** English

**Document Type:** Article

**KeyWords Plus:** NF-KAPPA-B; BCL-2 FAMILY PROTEINS; GLIOMA-CELLS; GLIOBLASTOMA-MULTIFORME; INDUCED APOPTOSIS; COMET ASSAY; P53 GENE; ACTIVATION; SURVIVIN; EXPRESSION

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**Publisher:** HINDAWI PUBLISHING CORPORATION

**Publisher Address:** 410 PARK AVENUE, 15TH FLOOR, #287 PMB, NEW YORK, NY 10022 USA

**Web of Science Categories:** Biotechnology & Applied Microbiology; Medicine, Research & Experimental

**Research Areas:** Biotechnology & Applied Microbiology; Research & Experimental Medicine

**IDS Number:** AM8KT

**ISSN:** 2314-6133

**eISSN:** 2314-6141

**29-char Source Abbrev.:** BIOMED RES INT

**ISO Source Abbrev.:** Biomed Res. Int.

**Source Item Page Count:** 16

**Funding:**

Funding Agency	Grant Number
Deanship of Scientific Research (DSR), King Abdulaziz University, Jeddah, Saudi Arabia	1431/130/163
DSR	

This project was funded by the Deanship of Scientific Research (DSR), King Abdulaziz University, Jeddah, Saudi Arabia, under Grant no. 1431/130/163. The authors, therefore, acknowledge with thanks DSR technical and financial support.

**Open Access:** gold

**Output Date:** 2017-08-10

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