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ANTIPROLIFERATIVE ACTIVITY ON HUMAN PROSTATE CELLS OF ESSENTIAL OILS OF THREE LEBANESE SALVIA SPECIES

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Prostate cancer is the leading cause of death from cancer in older men and the most commonly diagnosed cancer in men overall. Many patients are diagnosed when the cancer has already advanced to metastasis. Most patients with advanced disease respond initially to androgen-ablative therapies, but frequently in this stage, prostate cancer growth and development become independent of androgen and renders androgen ablation therapy ineffective [1]. At present available treatments for advanced, androgen-independent prostate cancer are only marginally effective [1]. In the Lebanese folk medicine, *Salvia* species are used by many people in various villages and towns for the therapeutic value of their essential oils and water extracts [2]. In this study we report the potential anticancer effect in androgen-insensitive (DU-145) and androgen-sensitive (LNCaP) human prostate cancer cells of essential oils from three *Salvia* species well known in Lebanon as component in several multiherb products used for the treatment of cancer and other diseases: *S. aurea* L., *S. judaica* Boiss and *S. viscosa* Jacq.

Aerial parts from *Salvia aurea*, *S. judaica* and *S. viscosa* were collected at the full flowering stage from plants wild growing at El Kfour, Lebanon, in August 2012. The air-dried samples were ground in a Waring blender and then subjected to hydrodistillation for 3 h using n-hexane as a solvent according to the standard procedure described in European Pharmacopoeia (2008). Analytical gas chromatography was carried out as previously reported [2]. The biological activity of the essential oils, was investigated against human prostate cancer cells, testing several biochemical parameters [2, 3], such as cell vitality (MTT assay), cell membrane integrity (lactate dehydrogenase release) and caspase-3 activity. In addition, the expression of Bcl-2 and Bax proteins was evaluated.

Results revealed that all the test essential oils were able to inhibit, after 72 h of treatment, the growth of cancer cells. Our data also demonstrate that these natural products induce apoptotic cell death that could be related to an overall action of the sesquiterpene compounds, particularly caryophyllene oxide, found in comparable concentration in all three samples. In conclusion, the experimental evidences presented here, could provide a further *in vitro* scientific support for the use of these species in traditional herbal preparations known in Lebanon and surrounding countries for the treatment of cancer. In addition, the selectivity of the essential oils *S. aurea*, *S. judaica* and *S. viscosa* in targeting cancer cells, sparing normal cells, suggests that these natural products for their active components could be candidate for further analysis with the aim to reduce the toxic side effects of chemotherapeutics in prostate cancer patients.

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