

The discoveries of chemotherapeutic agents biology essay

[Science](#), [Biology](#)



The discoveries of chemotherapeutic agents are based on inhibitory process in cancer cell cycle and destruct the tumor cells. Based on the mode of action on malignancy cells the chemotherapeutic agents are classified into alkylating agents attacking the cell DNA at any stage of cell cycle hindering replication, nitrosoureas inhibiting the DNA repair, antimetabolites mimicking a substance involved in DNA synthesis at " S" phase of the cell cycle, antitumor antibiotics binds with DNA to prevent RNA synthesis, plant alkaloids works by preventing cell division on binding to tubulin in turn arresting mitotic spindle formation will curb the movement of replicated DNA into newly forming daughter cells, and steroid hormones modifying the growth of hormone dependent cancers. A major problem with present cancer chemotherapy is the serious deficiency of active drugs for the curative therapy of tumors (Valeriote et al., 2002; Kinghorn et al., 2003). For thousands of years, natural products have played an important role throughout the world in treatment and prevention of human diseases (Chin et al., 2006). Alternative medicines are used widely all over the world (Cooper, 2004 & 2005). Some natural plants are currently being used extensively as food and health supplements, which help to combat cancer/tumor and stimulate immunity. In any case, the use of complementary and alternative medicines has not been as popular in modern medicine until recently. This may be most probably due to the lack of enough biological evidence stating their functional mechanisms. But for the past few decades, the value of complementary and alternative medicine (CAM) has been rediscovered by many modern scientific researchers, and numerous studies have established the potential use of herbal preparations

(Park et al., 2008; Kang et al., 2008). Plants are an important source of therapeutics from which 25% of the pharmaceuticals in current use have been derived (Farnsworth and Bingel 1977). Over 60% of the currently used anticancer agents are derived in one way or another from natural sources (Cragg et al., 2003; Balunas and Kinghorn, 2005; Cragg and David, 2005). However, of the estimated 250, 000 species of higher plants existing throughout the world, only a fraction has been examined for pharmacological activities (Balick 1990). One of the approaches used in drug discovery, is the ethnomedical data approach, in which the selection of a plant is based on the prior information and its use in folklore medicine. It is generally known that ethnomedical data provides substantially increased chance of finding active plants relative to random approach (Lee, 1999; Montbriand, 2004). The search for anti-cancer agents from plant sources started in the 1950s by discovery and development of the vinca alkaloids, vincristine, and the isolation of the cytotoxic podophyllotoxins (Reddy et al., 2003; Tsuda et al., 2004; Srivastava et al., 2005; Pezzuto, 1997). Therefore, the screening of higher plants for antiviral and anticancer agents has been actively pursued on an international scale, especially by the US National Cancer Institute (Farnsworth and Kaas 1981; Hudson 1989). Furthermore, mammalian cell culture systems have greatly aided the routine screening of plant extracts and compounds for anticancer activity using cytotoxicity and antiviral activity, which previously relied upon time-consuming, expensive and cumbersome in-vivo models. These screening efforts have resulted in the discovery of several prospective antiviral and anticancer compounds currently undergoing clinical trials (Ali et al., 1996). There is very little

literature available on the mechanism of T. indica and its effects on cancer cells. In this study, we aimed to establish the relation between this plant and its anticancer effect toward MCF 7 cancer cells, in regard to its mechanism of cell death and possible phytochemicals present. Lee KH. Novel Antitumor Agents from Higher Plants. Joun Wiley & Sons, Inc. Med Res Rev. 1999; 19(6): 569-596. Montbriand MJ. Herbs or Natural Products That Decrease Cancer Growth. Oncology Nursing Forum 2004; 31(4): E75-E90. Valeriote F, Grieshaber CK, Media J, Pietraszkewics H, Hoffmann J, Pan M, McLaughlin S. Discovery and development of anticancer agents from plants. Journal of Experimental Therapeutics and Oncology 2002; 2: 228-236. Kinghorn AD, Farnsworth NR, Soejarto DD, Cordell GA, Swanson SM, Pezzuto JM, Wani MC, Wall ME, Oberlies NH, David J, Keoll DJ, Kramer RA, Rose WC, Vite GD, Fairchild CR, Peterson RW, Wild R. Novel Strategies for the Discovery of Plant-Derived Anticancer Agents./ Pharmaceutical Biology 2003; 41: 53-67. Chin YW, Balunas MJ, Chai HB, Kinghorn AD. Drug Discovery from Natural Sources. The AAPS Journal 2006; 8(2): E239-E253. Cragg GM, Newman DJ. Plants as a source of anti-cancer and anti-HIV agents. Ann. Appl. Biol. 2003; 143: 127-133. Balunas MJ, Kinghorn AD. Drug discovery from medicinal plants. Life Sciences 2005; 78: 431-441. Reddy L, Odhav B, Bhoola KD. Natural products for cancer prevention: a global perspective. Pharmacology & Therapeutics 2003; 99: 1-13. Tsuda H, Ohshima Y, Nomota H et al. Cancer Prevention by Natural Compounds. Drug Metab. Pharmacokin. 2004; 19(4): 245-263. Srivastava V, Negi AS, Kumar JK, Gupta MM, Khanuja SPS. Plant-based anticancer molecules: A chemical and biological profile of some important leads. Bioorganic & Medicinal Chemistry 2005; 13: 5892-5908.

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