

## Red wine polyphenols and flavonols for cancer prevention

Written by Dr Dimitrios N. Gelis, MD, PhD, Otorhinolaryngologist -

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Dr Dimitrios N. Gelis, MD, DDS, PhD, Otorhinolaryngologist, Medical Nutritionist

Conventional cancer therapies, the second leading cause of death worldwide, result in serious side effects and, at best, merely extend the patient's lifespan by a few years. Searching for effective prevention is of high priority in both basic and clinical sciences. In recent decades natural products have been considered to be an important source of cancer chemopreventive agents [1].

Red wines contain a large array of polyphenolic constituents that have been shown to block carcinogenesis and to inhibit the growth of tumors in whole animals, or in cell culture by altering the activity of certain enzymes or the expression of specific genes. without recognizable side effects[1].

Suppression of in situ estrogen formation in the breast of postmenopausal women by aromatase inhibitors is considered to be a useful approach for prevention and treatment of breast cancer. Red wine polyphenols were found to be potent aromatase inhibitors, indicating potential treatment of breast cancer, since aromatase plays an important role in the

carcinogenesis of breast cancer. The previous hypothesis that red wine had stronger anti-cancer activities than white wine was confirmed by the difference in inhibition of aromatase activity[2, 3].

Resveratrol is a major component of red wine polyphenols, which has been studied and reviewed extensively for its chemopreventive activity to interfere with the multi-stage carcinogenesis [4]. However, resveratrol was not believed to be the only phytochemical that contribute to the chemopreventive activity of red wine. The recent progress in studies on cancer demonstrated chemopreventive activities of red wine polyphenol extracts and fractions as well as other red wine polyphenols [1].

Flavonols (τάξη των φλαβονοειδών) occur widely in nature in plants, including tea, berries, red grapes, and vegetables [6]. The flavonol concentration in red wine is about 30 times higher than that of resveratrol, and the major flavonol components in red wine are myricetin and quercetin [5], which typically represent 20–50% of the total flavonol content [5]. Several studies have shown that myricetin exhibited anticarcinogenic activities. It was indicated that myricetin had a potent antioxidant capacity [7]] and suppressed several cancers [8, 9, 10, 11]. It has also been demonstrated that myricetin exerted protective effects against two-stage skin tumorigenesis [9] and inhibited the growth of A549 lung cancer cells [10]. In colorectal cancer cells, myricetin inhibited the activity of matrix metalloproteinase-2 [11].

Recent findings have demonstrated potent anticancer-promoting activity for myricetin, which mainly targeted MEK signaling and inhibited COX-2 expression by blocking the activation of NF-κB. Although resveratrol was believed to be a promising cancer chemopreventive agent from red wine, the search for other novel cancer chemopreventive polyphenols, like myricetin, is also of significance.

Red wine polyphenol extracts and fractions were reported to delay tumor onset in transgenic mice, inhibit azoxymethane (AOM) induced intestinal carcinogenesis by modulation of gene expression, inhibit epidermal growth factor induced the proliferation of transformed colon epithelial cells by modulation of activation of mitogen-activated protein kinases and show selective cytotoxicity against MCF-7 breast cancer cells. Supported by above exciting evidence, further investigation on cancer chemopreventive activities of red wine polyphenol extracts and fractions are strongly recommended [1].

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