

The impact of Quercetin like flavonoid antioxidants on Cancer Therapy

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Abstract

Uncontrolled consumption of medical plants may lead controversial result over the patients who are receiving radiotherapy or chemotherapy for cancer treatment. Especially, flavonoid free radical scavenger including chemical and plants may not be innocent as much as thought. Free radical scavenger antioxidant extracts uses for commonly for two aims; the prevention of cancer and therapy of cancer.

In the light of recent developments the impact of antioxidant usage on cancer treatment and prevention is shortly reviewed in this article

Keywords: Antioxidant, Cancer, Oxidant, Therapy, Prevention

Human body has a critical balance between the oxidant and antioxidant status. Oxidants called Reactive oxygen species (ROS) and Reactive Nitrogen species (NOS) are highly active chemical molecules which are generated predominantly during cellular respiration and normal metabolism called endogenous Oxidants.

Other kind of oxidants are exogenous specifically produced by the ionizing radiation are highly toxic chemicals.

These products can damage many biological macro molecules; they are capable of changing enzyme functions, damage DNA materials and lipid peroxidations through the all cell membrane (1). Thus, they are evaluated as carcinogenic.

The superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPX) antioxidant enzyme protein binds to metals and minerals and inhibit production of free radicals

Moreover some antioxidants such as glutathione enzyme, albumin, vitamins C and E, carotenoids, and flavonoid capture the free radicals and inhibits oxidation activities, and they may prevent oxidative chain reactions.

Other important group of antioxidants such as lipases, proteases, DNA repair enzymes, transferases, and methionine-sulfoxide reductases are responsible for repair process of damaged DNA by the superoxides.

In other aspects, due to the DNA damaging effect, radiation caused by the reactive oxygen species are key components to destroy cancer cells during radiotherapy.

As it might be expected, the reducing environment inside the cell helps to prevent free radical mediated damages.

This reducing environment is maintained by the action of antioxidant enzymes and substances, such as superoxide dismutase (SOD), catalase, glutathione peroxidase, glutathione, vitamins C and E (2).

If the balance is disrupted and if ROS is produced excessively, over ROS may lead to starting of programmed cell deaths and may accelerate the process of aging (3).

In normal conditions, herbal sourced antioxidant intakes could be beneficial for cancer prevention (4, 5), coronary artery disease prevention (6) and slowing down the aging process.

But what will happen if the cancer patient takes artificial herbal sourced antioxidants, especially the free radical scavenger flavonoids which are abundantly present in many herbs, fruits and grains during therapy. Will it be helpful to the cancer therapy?

Some studies have shown that NAC and Trolox increases the activation of the small guanosine triphosphatase (GTPase) RHOA, and blocking downstream RHOA signalling abolished antioxidant-induced migration. These results demonstrate that antioxidants and the glutathione system play a previously unappreciated role in malignant melanoma progression. (7)

It is possible that the supplements did not trigger cancer, but rather accelerated the progression of existing diagnosed and undiagnosed cancers, making later discovery of the disease likely.

In other words, it "could be that while antioxidants might prevent cancer therapy targeted DNA damage in cancer cells too and thus impede tumor initiation once a tumor is established, or antioxidants might facilitate the malignant behaviour of cancer cells.

Some other findings imply that eliminating antioxidant enzyme activity may be an effective strategy to enhance susceptibility to cell death in cancer cells that may otherwise survive the ECM-detachment (8)

Most recent findings strongly suggest that reducing environment is beneficial for all cells survival not just normal/non-cancer cells.

Beside the in vitro studies, some clinical trials are also providing evidence on the relation between cancer and antioxidants.

For example, Physicians' Health Study II (PHS II): This trial examined whether supplementation with vitamin E, vitamin C, or both would reduce the incidence of cancer in male U.S. physicians ages 50 years and older. The results, reported in 2009, showed that the use of these supplements (400 IU vitamin E every other day, 500 mg vitamin C every day, or a combination of the two) for a median of 7.6 years did not reduce the incidence of prostate cancer or other cancers, including lymphoma, leukaemia, melanoma, and cancers of the lung, bladder, pancreas, and colon and rectum (9).

A lot of randomized controlled clinical trials also did not provide evidence that dietary antioxidant supplements are beneficial in primary cancer prevention (10).

The literature has a lot of controversial and immature datas about the question of is antioxidants beneficial or not?

For example curcumin has antioxidant properties, for this reason effect of curcumin on prostate cancer treatment has been studied by the Hejazi et al.

The result implies that Curcumin is an antioxidant agent with both radiosensitizing and radioprotective properties but no significant outcome was observed regarding to treatment outcomes over the prostate cancer patient (11).

However other important antioxidant vitamin E (α -tocopherol) is suggesting as strong therapeutic against cancer prevention and therapy (12).

Conclusion

Antioxidants do not act selectively, both endogen and exogen may prevent not only healthy cells and DNA, but also may prevent cancer therapy targeted DNA damage in cancer cells too.

Strong immune system may take over cancer, to protect ROS balance, not just a for reducing cancerous environment but also is necessity to protect life.

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