EDITORIAL

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From Antioxidant to Anticancer is Vitamin C Effective in Colorectal Cancer?

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Dear Editor,

Colorectal cancer stands as the third most prevalent form of cancer worldwide, both in terms of morbidity and mortality rates. Colorectal cancer typically originates as a benign adenomatous polyp, which can progress to advanced stages with high-grade dysplasia before developing into an invasive cancer. The genomic instability and mutations that are inactive tumor suppressor genes such as *TP53* and APC, simultaneously activate carcinogenic pathways like *BRAF* and *RAS* are the cause of this transformation [1]. Conventional medical interventions such as radiation and chemotherapy, although beneficial in combating cancer cells, also cause unintended harm to healthy cells [2]. Novel therapeutic and preventive strategies are thus desperately needed, and vitamin C's potential in this regard has received a lot of attention lately [3]. This correspondence aims to delve into the extensive body of research surrounding Vitamin C's effectiveness as an antioxidant and a potential anticancer agent, its mechanisms of action, and the need to include it in potential treatment regimens for its effectiveness.

It is widely recognized that cancer cells endure heightened oxidative stress compared to their healthy counterparts, and this is attributed to their elevated metabolic rates and compromised mitochondrial function. Reactive oxygen species (ROS) promote cellular proliferation and genetic instability, which in turn accelerate the growth of tumors [4]. Research highlights the plant kingdom as a potentially effective source of cancer preventive and therapeutic agents because of its diverse range of antioxidants, which include resveratrol, baicalein, vitamins A and C, polyphenols, and other bioactive compounds that have been shown to inhibit the growth of cancer cells in vitro, including those originating from the colorectal, breast, and cervical regions [5].

Ascorbic acid is particularly well-known for its antioxidant properties and its ability to combat colorectal cancer in several ways. It reduces oxidative stress and DNA degradation by first scavenging harmful free radicals. Secondly, it revitalizes other antioxidants and fortifies their protective qualities, such as vitamin E [6]. About 40% and 10% of human colorectal tumors (CRCs) have KRAS, and *BRAF* mutations respectively. KRAS directly targets *BRAF,* and both of them caused the mitogen-activated protein kinase (MAPK) pathway to be activated. According to clinical research, resistance to drugs that target the epidermal growth factor receptor (EGFR) is predicted by activating mutations in KRAS and *BRAF* [7]. Mutations related to KRAS and BRAF are frequently seen in colorectal cancer and are linked to *GLUT1* overexpression and a glycolytic phenotype. When cultured with mM doses of ascorbate, cancer cells with mutations in *KRAS,* and *BRAF* were demonstrated to uptake DHA via GLUT1, which was linked to a reduction in cell survival [8]. Furthermore, by modifying several signaling pathways, lowering important checkpoints, obstructing anaerobic glycolysis and angiogenesis, and upsetting their Warburg metabolism, while also preserving the health of colon cells [9]. Concurrent vitamin C delivery also has been shown to significantly alleviate chemotherapy-related side effects like constipation, sleeplessness, and exhaustion [3]. This suggests that vitamin C may be a promising complementary treatment for cancer. It is nevertheless recommended to exercise caution while administering intravenous vitamin C, especially to those who are pregnant or nursing mothers, have a history of kidney stones or oxaluria, have iron and copper storage disorders, or glucose 6 phosphate dehydrogenase (G6PD) insufficiency [10].

In conclusion, the significance of vitamin C in cancer therapy, coupled with its immunomodulatory effects, represents a notable breakthrough in the management of colorectal cancer, a global burden in terms of morbidity and mortality. The complex functions of vitamin C, including its role in regulating the metabolism of mutant cells and its potential in preventing treatment resistance, highlight how important it is to improve treatment results and change the face of colorectal cancer care. With every step ahead we are getting closer to realizing the full therapeutic potential of vitamin C in the fight against this difficult illness.

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